



DEPARTMENT OF ENVIRONMENTAL SERVICES  
Office of Sustainability and Environmental Management  
2100 Clarendon Blvd., Suite 705 Arlington, VA 22201  
TEL 703.228.4488 FAX 703.228.7134 [www.arlingtonva.us](http://www.arlingtonva.us)

September 21, 2012

J. Douglas Fritz  
MS4 Program Manager  
Department of Conservation and Recreation  
900 East Main Street, 8<sup>th</sup> Floor  
Richmond, VA 23219

Dear Mr. Fritz:

Enclosed is Arlington County's annual report for fiscal year 2012 as required for compliance with the County's Virginia Pollutant Discharge Elimination System permit (VA0088579). Arlington County's Department of Environmental Services, Office of Sustainability and Environmental Management staff prepared the report, with assistance from other County agencies.

As required by the permit, the report outlines the County's storm water management program for the FY 2012 reporting period (July 2011 through June 2012). If you have any questions regarding this report, please contact Jason Papacosma at (703) 228-3613.

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

  
\_\_\_\_\_  
Jeff Harn  
Chief

Office of Sustainability and Environmental Management

Cc:

Greg Emanuel, Director/DES  
Jason Papacosma, DES/OSEM  
Allan Rowley, DES/OSEM



# Arlington County, Virginia





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# 1 Introduction

This Municipal Separate Storm Sewer System (MS4) Permit annual report has been prepared by Arlington County's Department of Environmental Services. It is required for compliance with the Authorization to Discharge under the Virginia Pollution Discharge Elimination System (VPDES) permit (VA0088579). The Virginia Department of Environmental Quality (DEQ) originally issued this permit to Arlington County on August 15, 1997, and renewed this permit for a second five-year term on August 28, 2002. The permit is now administered by the Department of Conservation and Recreation (DCR). The County's stormwater management programs are outlined in this report as required by the permit. Unless otherwise noted, this report covers Fiscal Year 2011: July 1, 2011 to June 30, 2012.

## **Watershed management overview**

The population and development characteristics in Arlington County and their relationship to the County's water resources systems can be briefly summarized with the following statistics:

- 2011 population estimate: 211,700 people
- 26.5 square miles
- 7,989 persons/square mile
- 42% impervious cover
- 366 miles of public storm sewers
- 28.5 miles of perennial streams

Arlington's key watershed management challenges are:

- Legacy land use and drainage decisions make stormwater and watershed management in urban areas like Arlington extremely challenging
- Existing development has a much greater impact on streams than new/re-development, since most development occurred before regulations that protect water quality and stream channels were implemented
- Most County streams are in fair condition at best
  - Habitat and geomorphological impacts to stream ecology from severely altered watershed hydrology are at least as important as impacts from stormwater pollution
  - Impairments for waters on the state's 303(d) list do not account for the physical impacts to local stream ecology from urban development and impervious cover
  - Infrastructure damage from stream degradation is significant
- Redevelopment/retrofitting provides opportunities to improve watershed health over the long term but will not quickly or fully repair damage to stream ecology and urban infrastructure

These challenges have led to the formulation of the following watershed management strategy for Arlington County:

- Implement urban housekeeping 'best practices' (e.g., street sweeping, catch basin cleaning, storm sewer inspections, pollution prevention, etc.)

- Restore stream corridors to address geomorphological and infrastructure impacts and improve habitat and ecology
- Reduce risks to public/private property from flooding
- Maintain stormwater infrastructure
- Identify opportunities for BMP retrofits to the landscape and storm sewer system over the long-term to reduce stormwater pollution
- Require on-site stormwater controls for new development
- Outreach and education
- Effective and targeted monitoring programs that leverage volunteer and other resources

### Key accomplishments

- **The stormwater and watershed management programs initiated since the beginning of the County's MS4 permit program are reducing stormwater pollution.** Pollutant load modeling estimates that these programs have achieved a 9 percent nitrogen reduction, 10 percent phosphorus reduction, 18 percent total suspended solids reduction, and 1 percent bacteria reduction.
- **Impervious cover per person has actually declined in Arlington due to the County's smart growth development policies.** This is in contrast to the trend throughout much of the Bay watershed.
  - **A more comprehensive stormwater and watershed management program with dedicated funding and increased project planning and implementation capacity was established in 2008.** Substantial new program initiatives have already been completed and others will continue as part of this enhanced stormwater/watershed management program. These initiatives are described throughout this report.
- **Arlington's watershed management programs have been recognized for innovation and leadership regionally and nationally.** Examples include:
  - Staff participation in two of the Chesapeake Bay Program's expert panels during 2011 and 2012: Retrofits and Illicit Discharges
  - Presentations at the 2011 Low Impact Development (LID) conference and 2012 Chesapeake Stormwater Partners Retreat.
  - A 2-day conference sponsored by Virginia Tech in June 2009 in Arlington with 100 attendees that focused on the County's stream restoration programs and featured a tour of Donaldson Run: [www.forestry.vt.edu/urbanstreamrestoration](http://www.forestry.vt.edu/urbanstreamrestoration)
  - Presentation of the County's rain barrel program at EPA's 5th National Conference for Nonpoint Source and Stormwater Outreach in May 2009: [www.epa.gov/nps/outreach2009/pdf/051209\\_1100A1c\\_Winquist.pdf](http://www.epa.gov/nps/outreach2009/pdf/051209_1100A1c_Winquist.pdf)
  - Presentation of the County's watershed outreach and education programs at EPA's 2008 Nonpoint Source and Stormwater Pollution Education Programs national conference: [www.epa.gov/owow/nps/2005proceedings.html](http://www.epa.gov/owow/nps/2005proceedings.html)
  - A U.S. Environmental Protection Agency (EPA) stormwater case study: [cfpub.epa.gov/npdes/stormwater/casestudies\\_specific.cfm?case\\_id=15](http://cfpub.epa.gov/npdes/stormwater/casestudies_specific.cfm?case_id=15)
- **Arlington's sanitary sewer, wastewater management, and water conservation programs have also realized significant accomplishments:**



- Arlington leads the region with its \$568 million investment to upgrade the County's wastewater treatment plant to limit-of-technology treatment standards to protect Four Mile Run, the Potomac River, and the Chesapeake Bay.
- Since 1997, more than 27 percent of the 465 mile sanitary sewer system has been re-lined, extending the life of re-lined pipes by 50+ years without disruptive construction. This effort has reduced infiltration of stormwater and groundwater into the system substantially, thereby helping to maintain the design capacity of the wastewater treatment plant available to accommodate future development. This program is funded to re-line the entire sanitary sewer system by 2072 (1.5% per year).
- The County's green building incentive and education programs emphasize a broad range of water conservation strategies (which reduce wastewater generation) as key elements of sustainable building practices.

### **Program management**

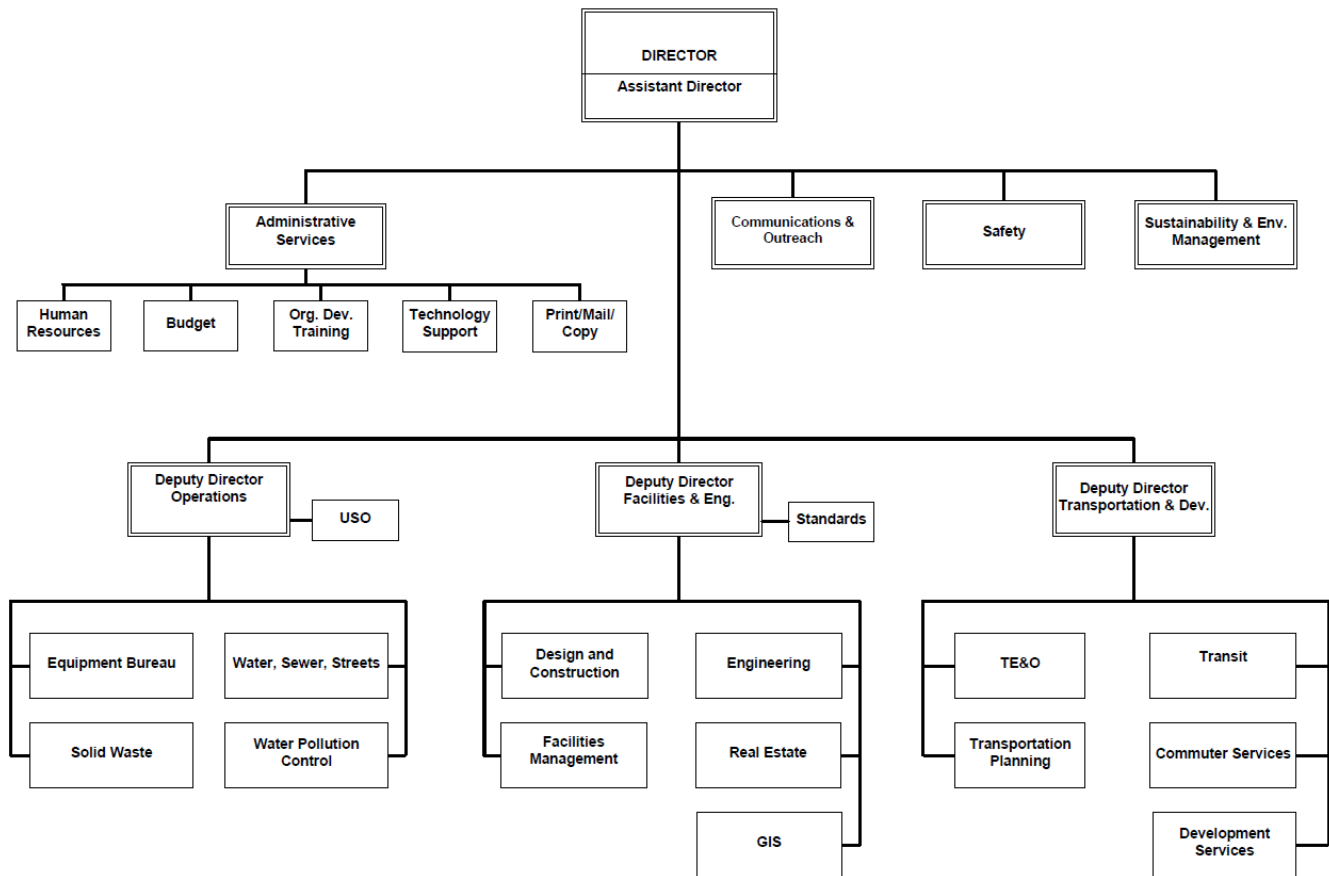
Arlington County's watershed management program involves several different agencies. Primary management, including administration of the County's MS4 permit, is provided by the Department of Environmental Services (DES) in the Office of Sustainability and Environmental Management (OSEM) – a new office created as part of a DES-wide re-organization during FY 2011. Street sweeping and associated activities are conducted by the DES Solid Waste Bureau within the Operations Division. Much of the engineering, design, plan review and infrastructure planning work is the combined responsibility of the Facilities and Engineering Division, the Water, Sewer, Streets Bureau within the Operations Division, and OSEM. The Water, Sewer, Streets Bureau also manages the maintenance of sanitary and storm sewers. Public education is conducted by both DES and the Department of Parks and Recreation (DPR), and cleanup of spills and hazardous materials is conducted by the Fire Department.

The new DES organizational chart is provided below.

### List of County agency acronyms referenced in this application:

|      |   |
|------|---|
| ACFD | Arlington County Fire Department                        |
| CPHD | Community Planning, Housing, and Development Department |
| DES  | Department of Environmental Services                    |
| DOT  | Division of Transportation and Development              |
| DPR  | Department of Parks and Recreation                      |
| DG   | Development Services Group                              |
| ENG  | Facilities and Engineering Division                     |
| OD   | Operations Division                                     |
| OSEM | Office of Sustainability and Environmental Management   |
| SWB  | Solid Waste Bureau                                      |
| WPCB | Water Pollution Control Bureau                          |
| WSS  | Water Sewer Streets Bureau                              |

# DEPARTMENT OF ENVIRONMENTAL SERVICES



## 2 Status of the Storm Water Management Program

Note – The lettered headings in this section correspond with the lettered headings in Section B.1 of Arlington County's MS4 Permit.

### A. Structural and Source Controls

#### Summary of program

| Program element  | Responsible party    |
|--|----------------------|
| Inspection and maintenance of public stormwater management facilities                                | DES/OSEM             |
| Inspection of private stormwater management facilities   | DES/OSEM             |
| Maintenance agreement/maintenance certification program for private stormwater management facilities | DES/DOT/DG; DES/OSEM |

#### Municipal Owned Facilities

The County currently has a contract in place for annual inspection and maintenance of County owned stormwater management facilities. In FY 2012, 23 DES facilities and 17 DPR facilities were inspected and 19 had maintenance conducted. Fewer facilities needed major maintenance than in the past because they are now on a routine schedule.

#### Privately Owned Facilities

Maintenance agreements are required for all proposed privately owned stormwater management facilities before a building permit is issued. Owners are required to submit inspection and maintenance records to the County annually. In FY 2012, 227 (50%) detention facilities were certified as being in working order and 57 (68%) stormwater management facilities with maintenance agreements submitted inspection and maintenance records. Fourteen (14) overdue notices were sent to owners of stormwater management facilities that have recorded maintenance agreements that didn't respond to the first request for records.



## **B. Areas of New Development and Significant Redevelopment**

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| <b>Summary of program</b>  |                          |
|--|--------------------------|
| <b>Program element</b>   | <b>Responsible party</b> |
| Requirement of controls for stormwater quality/quantity from new development/redevelopment | DES/DOT/DG; DES/OSEM     |
| Requirement of erosion and sediment controls during construction                           | DES/DOT/DG               |
| Green building programs  | DES/OSEM; CPHD           |

### **Stormwater controls for new development/redevelopment**

Together, the County's Chesapeake Bay Preservation Ordinance and Stormwater Detention Ordinance require the control of post-construction stormwater quality and quantity from development projects. All projects with land disturbing activity exceeding 2,500 square feet are reviewed for compliance with both ordinances in DES/DOT, with regulatory, policy and technical support provided by DES/OSEM. In addition, most activity within the Resource Protection Area (generally within 100 feet of a stream channel) is reviewed by DES/DOT/DG and DES/OSEM, regardless of the level of land disturbance.

#### Chesapeake Bay Preservation Ordinance

The County enacted the Chesapeake Bay Preservation Ordinance (Chapter 61 of the County Code) in August 1992, with substantial revisions adopted in February 2003 to be consistent with changes in the State Chesapeake Bay Designation and Management regulations as well as the recommendations of a Board-appointed task force.

The ordinance was attached as Appendix B to Arlington's 2007 permit renewal application. A comprehensive guidance manual is available at

<http://www.arlingtonva.us/Departments/EnvironmentalServices/epo/pdf/files/cbpoguide.pdf>

In FY 2012, DES approved 178 land disturbance applications for projects that will disturb greater than 2,500 square feet of land for a total of 72.6 acres of disturbed land. The proposed impervious cover for all projects approved in FY 2012 totals 34.2 acres, an increase of 2.8 acres over existing impervious cover (34.1 acres) for the sites where these projects were approved. The total site area for projects approved in FY 2011 is 83.5 acres.

#### Stormwater Detention Ordinance

The Stormwater Detention Ordinance requires that the peak runoff rate from new development and redevelopment be maintained close to predevelopment levels (assuming forested condition). Arlington County first enacted the ordinance in 1976 in response to the Four Mile Run Flood Control Agreement with the U.S. Army Corps of Engineers.

The ordinance was extended County-wide in 1982. Under the Stormwater Detention ordinance, stormwater detention in the Four Mile Run watershed must be provided for the 100-year event from the developed site and released at a rate equivalent to a 10-year event from the site in its pre-developed condition. For the Potomac watershed, stormwater detention must be provided for the 10-year event from the developed site and released at a rate equivalent to a 10-year event from the site in its pre-developed condition. Release at the 10-year flood runoff rate was chosen because public storm sewers are generally designed to convey this magnitude event.

The ordinance was attached as Appendix C to Arlington's 2007 permit renewal application.

In June 2010, the Arlington County Board approved a change to civil penalties for the violations of the Detention Ordinance. Penalties of up to \$1,000 per day per offense can now be assessed against owners who fail to submit certifications for inspections and who fail to maintain their facilities.

### **Erosion and sediment control during construction**

See Section I.

### **Green building programs**

Originally adopted in October 1999, the County's green building incentive program was revised and enhanced in 2003, 2009, and again in 2012. The program allows a private developer to apply for additional density if the project achieves energy efficiency goals in addition to achieving a Leadership in Energy and Environmental Design™ (LEED) award from the US Green Building Council. The program applies to all types of building projects (office, high rise residential, etc.) achieving a LEED award of Silver, Gold, or Platinum. The LEED rating system includes a number of credits for various site planning, conservation, and stormwater management strategies.

A similar program—the Green Home Choice program—is in place for single-family residential construction, and provides an incentive in the form of front-of-the-line permitting for builders that participate.

In addition, new County government buildings are designed and constructed to achieve at least the LEED Silver rating. Several facilities have been completed in recent years with innovative stormwater management practices, including the Langston-Brown Community Center, Walter Reed Community Center, and Parks Operations Building (see photos on next page for examples).



Vegetated roof retrofit at County office building



Rainwater collection tank at  
Langston-Brown Community Center



Vegetated roof at Fire Station #5



## C. Roadways

| Summary of program              |                   |
|---------------------------------|-------------------|
| Program element                 | Responsible party |
| Street sweeping                 | DES/OD/SWB        |
| Catch basin cleaning            | DES/OD/WSS        |
| Storm sewer inspection/cleaning | DES/OD/WSS        |
| Roadway de-icing                | DES/OD/WSS        |

Arlington County operates several key programs to reduce pollutants discharged from the MS4 resulting from the operations and maintenance of public streets, roads and highways. These programs include the County's street sweeping program, which was expanded in 2001 to include residential areas. This resulted in nearly tripling the miles of streets that receive regular vacuum sweeping. The County also has a catch basin cleaning program, which was expanded in 2002 to greatly increase the number of catch basins cleaned each year, as well as a storm sewer TV inspection and cleaning program, which began in 2002.

Roadway sanding and de-icing is performed only as required by public safety, with an awareness of the environmental impacts of excessive salting and sanding. All roads in the County are swept in the spring to capture sand and salt accumulation from winter road maintenance (roads are swept less frequently in the winter because of the risk of water sprayed by the sweepers freezing on roadways).

These programs are described in more detail in the sections below.

### Street sweeping

In urban areas like Arlington, where space is limited for regional stormwater facilities, street sweeping is one cost-effective approach to remove the sediments and associated pollutants that accumulate on streets before they wash into streams.

The table below provides key performance measures for this program since FY 2001, including the amount of material collected by sweepers, lane miles swept by sweepers in residential and commercial areas, and the frequency of sweeping in each of these areas (i.e., number of times each year each area is swept). Data is reported in 'tons' beginning in FY 2010. In addition, beginning in FY 2012, the County computed more accurate 'lane miles' information which has reduced the calculated number of lane miles (but does not mean that fewer streets were swept).

In FY 2010, severe winter weather throughout the season resulted in a reduction in sweeping frequency. An early snowstorm delayed the completion of leaf collection activities until late Spring, with the significant storms in late January and early February requiring extensive snow removal, de-icing, and sanding operations. Together, these factors resulted in a later start to the sweeping season and more material to remove from the streets.

| Street sweeping information |  |   |  |
|-----------------------------|--|---|--|
|                             | Cubic yards<br>of particulate<br>matter<br>collected | Residential<br>lane miles<br>swept / # of<br>cycles | Commercial<br>lane miles<br>swept / # of<br>cycles |
| 2001                        | 4,786  | NA  | NA   |
| 2002                        | 6,380  | NA / 4.5  | NA / 13  |
| 2003                        | 6,901  | 10,082 / 5.26                                       | 6,760 / 13   |
| 2004                        | 4,786  | 8,082 / 4.2   | 6,500 / 12.5                                       |
| 2005                        | 5,744  | 10,265 / 6  | 6,049 / 11   |
| 2006                        | 5,697  | 10,159 / 6  | 6,200 / 12   |
| 2007                        | 5,409  | 10,261 / 6  | 6,000 / 11   |
| 2008                        | 3,819  | 11,929 / 7  | 6,760 / 13   |
| 2009                        | 3,072  | 14,910 / 8.75                                       | 7,410 / 14.25                                      |
| 2010                        | 1,580*   | 7,096 / 5   | 3,946 / 9  |
| 2011                        | 1,529*   | 4,009 / 7   | 7,929 / 13   |
| 2012                        | 1,263*   | 4,971 / 7   | 4,344 / 14   |

\*Data reported as tons.

### Storm sewer maintenance and infrastructure management

Storm sewer maintenance consists of a program to comprehensively inspect and clean catch basins and grate inlets and to inspect storm sewers with TV cameras. Data for these contracted programs, which include linear feet of sewer inspected, number of catch basins cleaned, and weight of material removed through both programs, are reported in each year's annual report. The maintenance program also includes repairs to damaged or failed pipes, structures, and the cleaning of blocked sewer mains. Maintenance to keep open channels clear, and removal of vegetation along the Four Mile Run flood control project is also included under this program.

In addition, County crews respond to citizen complaints and perform additional maintenance (other than debris removal) that is identified by contractors during regular inspections. County crews also perform maintenance of creeks and open channels, but only on a complaint basis.

| Catch basin cleaning information   |                |         |
|------------------------------------|----------------|---------|
| Year                               | Inspected      | Cleaned |
| 2002                               | 3,881          | 2,503   |
| 2003                               | 2,530          | 1,056   |
| 2004                               | 12,608         | 2,272   |
| 2005                               | 2,359          | 698     |
| 2006                               | 731            | 621     |
| 2007                               | 1,293          | 1,205   |
| 2008                               | 881            | 366     |
| 2009                               | 2,150          | 401     |
| 2010                               | 2,142          | 684     |
| 2011                               | 3,869          | 1,389   |
| 2012                               | 1,897          | 1,297   |
| Storm sewer inspection information |                |         |
| Year                               | Feet inspected |         |
| 2002                               | 55,583         |         |
| 2003                               | 157,677        |         |
| 2004                               | 103,396        |         |
| 2005                               | 102,871        |         |
| 2006                               | 35,859         |         |
| 2007                               | 99,772         |         |
| 2008                               | 119,162        |         |
| 2009                               | 256,039        |         |
| 2010                               | 416,017        |         |
| 2011                               | 345,788        |         |
| 2012                               | 316,385        |         |

See the 'Dry weather screening' section of this report for summary statistics.

### Roadway de-icing

The County's strategy for de-icing roadways during winter weather is as follows:

1. During snowfall, snow crews concentrate only on keeping the main arteries (shown on the snow maps) passable for public transportation and emergency vehicles.
2. After snow stops falling, crews concentrate on clearing snow from all streets for general public use as promptly as possible. Neighborhood streets are cleared last. Snow crews work in teams around the clock toward these two goals, with a force of approximately 150 crew members, 70 pieces of snow control equipment, two salt storage facilities with a capacity of 10,000 tons, and snow budgets averaging \$600,000 annually.

Plowing generally begins when snow becomes two to four inches deep if freezing temperatures indicate that there will be no melting. However, when the snow depth stops at four inches and afternoon sun is melting the snow, the County lets melting occur. Some snow is left on the

street after plowing because allowances must be made for manhole lids and other above-pavement obstacles to avoid damaging snowplow blades.

The 376 miles of streets maintained by Arlington County are cleared in this order: snow emergency routes, arterial streets, main bus routes, roads to hospitals, fire stations, Metro stations, and the police station. All remaining residential streets, with steep hills cleared first. There are 60 miles each of arterial and collector streets and 256 miles of residential streets. Overall, the County believes this strategy achieves critical public safety objectives while minimizing adverse water quality impacts.

#### **D. Retrofits**

| Summary of program   |                         |
|--|-------------------------|
| Program element  | Responsible party       |
| Watershed retrofits  | DES/OSEM and DES/OD/WSS |
| Stream restoration   | DES/OSEM and DES/OD/WSS |
| NOx reductions through transit-oriented development and fleet vehicle technology | DES/ENG; CPHD           |

Arlington County is in the process of updating its Stormwater Master Plan. A key component of this effort is the development of watershed retrofit plans for County watersheds and a comprehensive stream inventory to identify and prioritize stream restoration projects.

#### **‘Smart growth’ as a BMP**

Arlington County is recognized as a leader in ‘smart growth’ planning and development policies. With a strong emphasis on high-density development in corridors served by mass transit, Arlington County has managed to reverse the trend seen throughout much of the Bay watershed: impervious area in Arlington has grown at a lower rate than population growth.

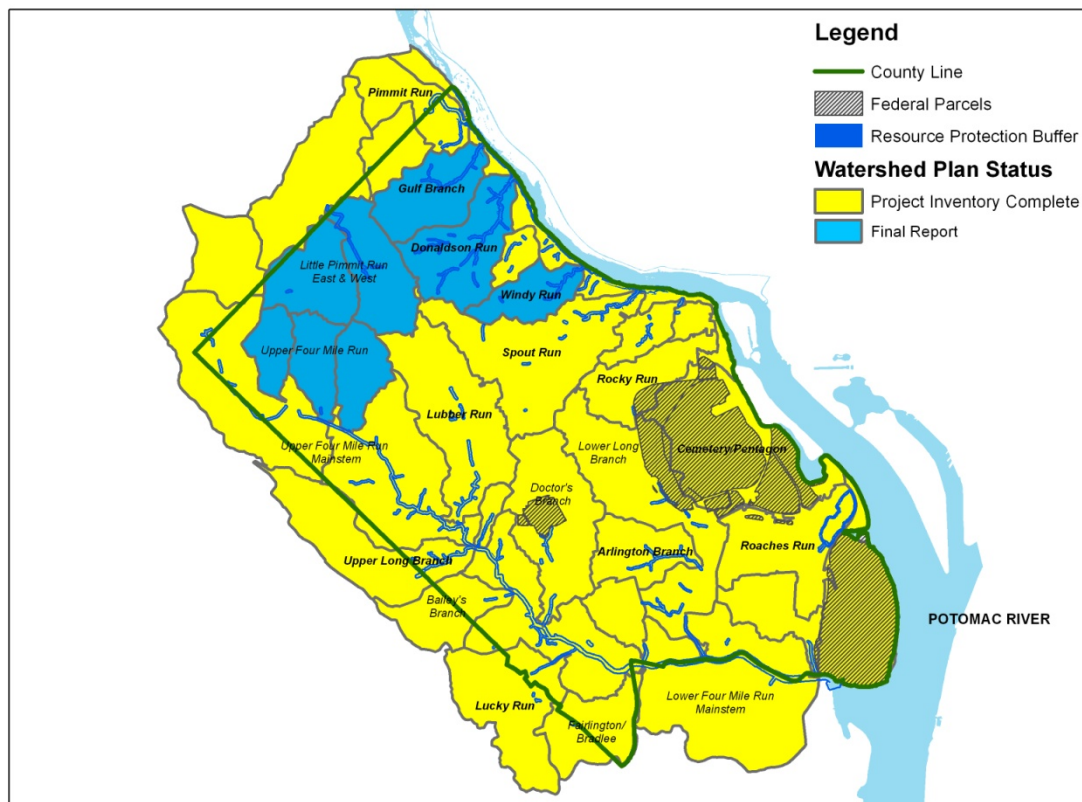
In 2001, the number of impervious acres per person was 0.0352, or 1,532 square feet. In 2011, the most recent year for which data are available, there were 0.0336 impervious acres (1,464 square feet) per person, a decrease of 4.5 percent. Over this time period, population increased by 11 percent while impervious cover increased by 4.7 percent.

This reduced ‘stormwater’ footprint can be considered a BMP. On a regional scale, increasing population density in Arlington on a smaller impervious footprint per person provides important water quality and stream protection benefits.

## Watershed retrofits

Watershed retrofit plans are being developed for the County by the Center for Watershed Protection, one of the leading watershed planning organizations in the country. Final plans are available for seven watersheds or 18% of the County. Completed project inventories/draft plans are available for the remaining Arlington County watersheds. Final reports for all watersheds will be available in FY 2013.

Arlington County's Watersheds



Four public meetings were held in association with watershed retrofit planning during FY 2012. At each meeting, residents learned about their local watersheds and the retrofit planning initiative. They also suggested potential retrofit opportunities. Resident suggestions were subsequently field assessed and incorporated in the project inventory, if viable. A total of 37 residents participated in these meetings.

Watershed retrofit planning has resulted in a County-wide inventory of 1,198 projects. The inventory consists primarily of street bioretention projects, but also includes opportunities for impervious cover removal, rainwater harvesting, pervious pavement, regenerative stormwater conveyance and stormwater planter installation. Watershed planning data indicates that on average retrofit projects can treat 9 percent of Arlington's impervious cover (based on 2009 data), illustrating the relatively limited scope for retrofits in an urban community like Arlington.

Implementation of the watershed retrofit plans is already underway. During FY 2012, Arlington County constructed two streetscape retrofit projects. A third streetscape project is currently under construction. Arlington County also completed water quality retrofits at the Arlington



County Trades Center. An additional eight projects are currently in design; three more are approved and design work will begin in FY 2013.

Construction of Arlington's second streetscape bioretention retrofit was completed in December 2011. The retrofit was funded by Arlington's Department of Transportation and is located in a right-of-way median on 23<sup>rd</sup> St N, at the intersection with N. Albemarle St. The project is located in the Spout Run watershed and treats 0.73 total acres; 0.29 acres of which are impervious.



*23<sup>rd</sup> St N at Albemarle Right of Way Bioretention*

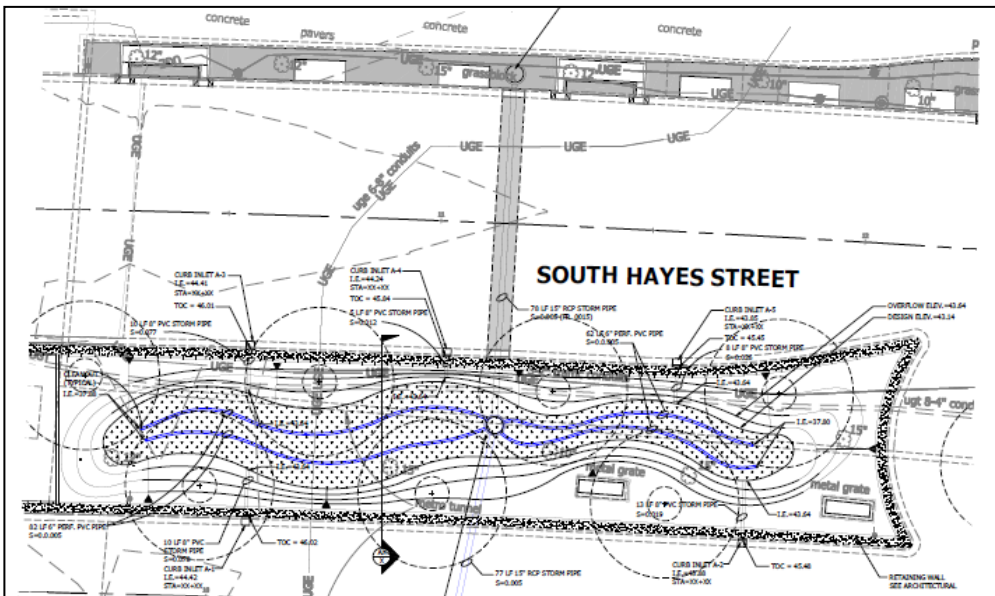
An additional retrofit, a parking lot bioswale in the Four Mile Run (Middle Mainstem) watershed was installed in the public right of way for Shirlington Road near the intersection with S. Four Mile Run Dr. The impervious area treated by the bioswale is 3500 square feet, or 0.08 acres.

The retrofit installed at Patrick Henry Drive at 9<sup>th</sup> Road North in FY 2011 has been regularly maintained and continues to function as designed. This facility treats 0.51 acres of impervious area and 0.75 acres total. In the last year, an educational sign was installed in the facility to inform the local community (and any passing pedestrians) about the purpose and elements of the retrofit.



*Shirlington Road Bioswale (left) and Patrick Henry Dr at 9<sup>th</sup> Rd N Median Bioretention (right)*

During FY 2012, the County retrofitted its 40-acre Trades Center to filter nutrients, trash, petroleum products and sediment in stormwater runoff from portions of the facility. The Trades Center is the staging site for the County's industrial operations including vehicle and equipment maintenance, fueling, material storage, and earth products processing. The retrofit project included installation of a StormFilter® system at the Solid Waste Bureau Earth Products Recycling Yard. The underground system contains 20 media-filled cartridges and will treat runoff from approximately two acres. Additionally, a total of 85 Ultra Urban Filters were installed inside seventeen storm drains on the east side of the facility. Collectively, the filters will help filter stormwater runoff from approximately 5.4 acres. The filter units capture sediment and trash that is carried by runoff and contain filter media that absorbs petroleum products.



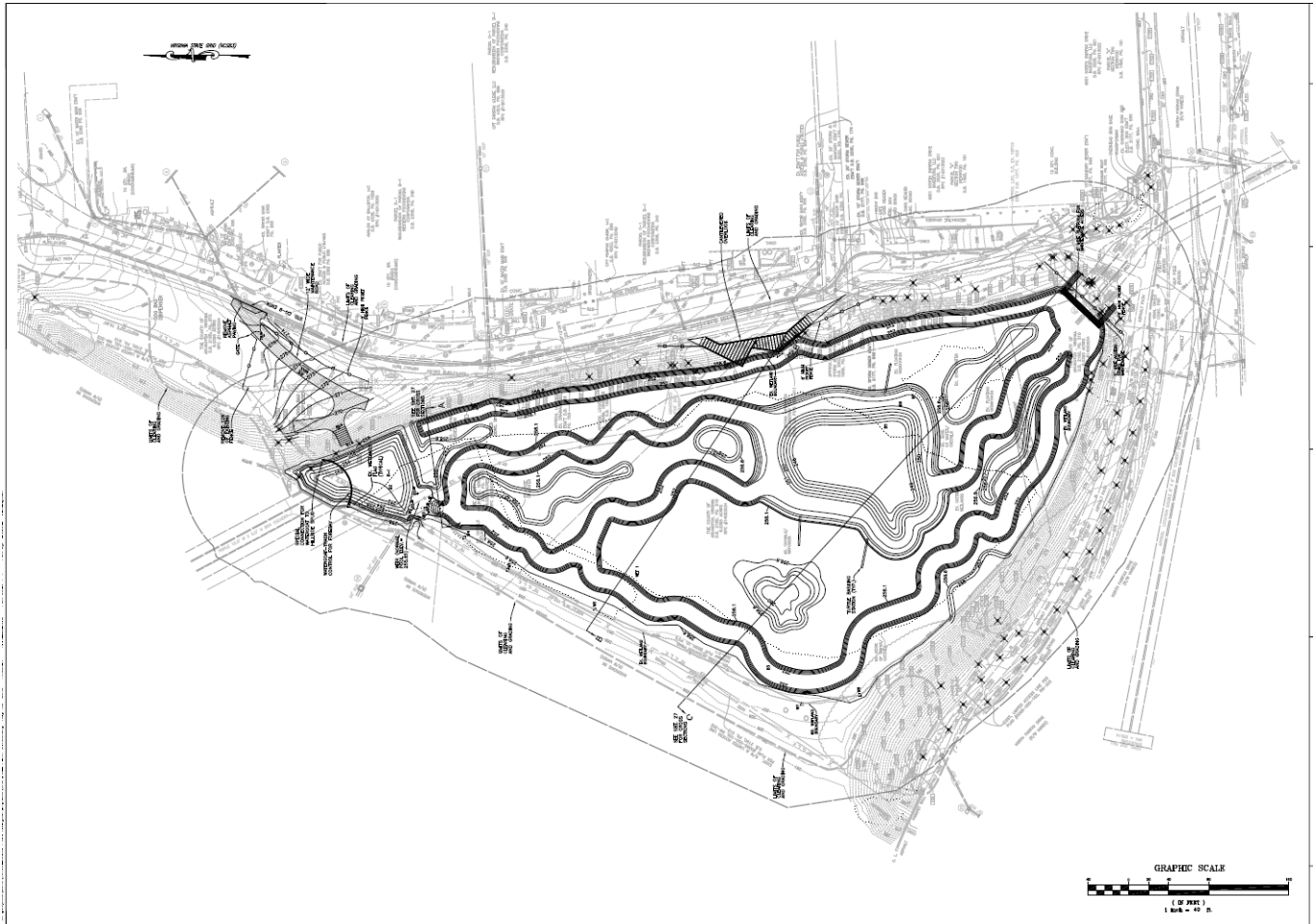
*Pentagon City (S. Hayes St.) Streetscape Bioretention*

A multi-modal transportation project on S. Hayes St in the Roaches Run watershed, which will include bioretention in the street median and flow-through planters along the street frontage, is currently under construction. The stormwater elements will be constructed in FY 2013.

Eight additional watershed retrofit projects are in design, including:

- Two streetscape curb extension bioretention retrofits in the Doctor's Branch watershed;
- Five streetscape bioretention retrofits in the Little Pimmit Run watershed; and,
- Retrofit of the Ballston Pond (see below).

Arlington is in the final stages of design and permitting for a retrofit for the Ballston Pond. This pond was originally designed as a dry pond for I-66 and is Arlington's largest opportunity to treat stormwater.



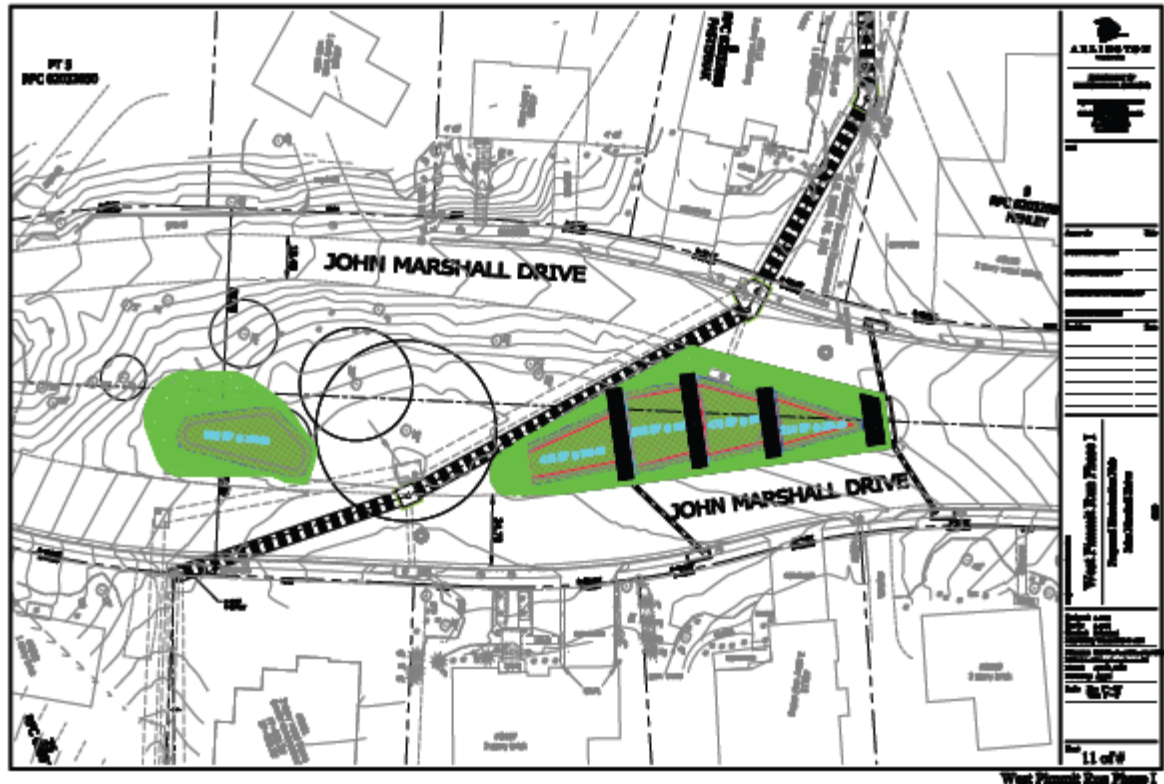
*Ballston Pond 90% Designs*

The pond receives runoff from 400 acres of mostly residential drainage. The goal of the retrofit is to design the pond to meet the design standard for Level I of a Constructed Wetland as outlined in DCR's Stormwater BMP Clearinghouse, with an expectation to receive treatment credit for a portion of the 400 acre drainage area. Design for the project is nearly finished and permitting has started. Pretreatment for invasive plants is set to begin during Fall 2012, with



clearing and grubbing to begin in Spring 2013. It is anticipated that grading will begin in FY 2013.

The public process is a significant element of all of these projects. Meetings are held with directly impacted residents and with local civic associations. In FY 2011, two public meetings were held to provide information and field questions about streetscape watershed retrofits. For the Ballston Pond project, a stakeholder group and public meetings have been held to guide the project and inform the community.



*John Marshall Median Retrofit 60% Design (Little Pimmit Run watershed)*

Additional approved projects include:

- Two streetscape bioretention retrofits in the Torreyson Run watershed and
- A street median bioretention retrofit project in the Crossman Run watershed.

Retrofits are an important element of the County's watershed management program and the overall Chesapeake Bay cleanup effort and will be pursued as extensively as resources and physical feasibility allow. However, retrofitting in urban areas like Arlington is a resource-intensive, long-term effort with physical limits on the extent to which these efforts can restore watershed hydrology and reduce pollutant inputs.

For more information, see:

Watershed Retrofit Planning

<http://www.arlingtonva.us/departments/EnvironmentalServices/Sustainability/page67082.aspx>

Green Streets Initiative

<http://www.arlingtonva.us/departments/EnvironmentalServices/Sustainability/page81126.aspx>

Trades Center Retrofit

<http://www.arlingtonva.us/departments/EnvironmentalServices/Sustainability/page83049.aspx>

Ballston Pond

<http://www.arlingtonva.us/departments/EnvironmentalServices/Sustainability/page75451.aspx>

### **Stream restoration**

In addition to watershed retrofits, stream restoration is an important (and often the most feasible) tool in urban areas for reducing sedimentation in streams, sediment and nutrient export downstream, improving habitat, and protecting infrastructure. In fact, EPA's Chesapeake Bay Program provides sediment and nutrient reduction credits for stream restoration projects within the Bay watershed.

Projects completed in recent years include the Donaldson Run Tributary A and Donaldson Run Headwaters stream restoration projects, totaling more than 3,500 linear feet of restoration and reported on in previous annual reports.



*Donaldson Run Tributary A stream restoration project, June 2011.*



Projects currently in the planning and design phase are described below.

Donaldson Run Tributary B

This project will restore an additional 1,400 linear feet of Donaldson Run along 'Tributary B,' which enters the already restored section of Donaldson Run approximately 1,100 linear feet upstream of Military Road. The 95 percent designs for this project were completed in FY 2012, with design completion expected during FY 2013.



*Donaldson Run Tributary B, at confluence with stream restoration project, July 2010, showing restored stream on left with low sediment content and unrestored Tributary B on the right with high sediment content.*

[illegible]

## Windy Run

This project includes restoration of approximately 450 linear feet of Windy Run to protect a sanitary sewer lift station, re-alignment of an exposed sanitary sewer, and repair of a failed slope and trail damaged during the June 2006 storm. The 95 percent designs for this project were completed in FY 2012, with design completion expected during FY 2013.

## Four Mile Run

The lower portion of Four Mile Run, from I-395 at the upstream end to the mouth at National Airport, marks a rough boundary between Arlington County and the City of Alexandria. Along this stretch of Four Mile Run are neighborhoods, commercial districts and some industrial facilities, including the Arlington County Water Pollution Control Plant. Because of the highly urbanized nature of the Four Mile Run watershed, the neighborhoods and businesses adjacent to this portion of the run were subjected to repeat flooding beginning in the 1940s. In response to this flooding, the municipalities partnered with US Army Corps of Engineers (USACE) to build a flood control channel in the lower portion of Four Mile Run. Construction of that channel took place during the 1970s and early 1980s. Since its completion, over twenty years ago, the channel has safely conveyed high storm flows through the two jurisdictions.

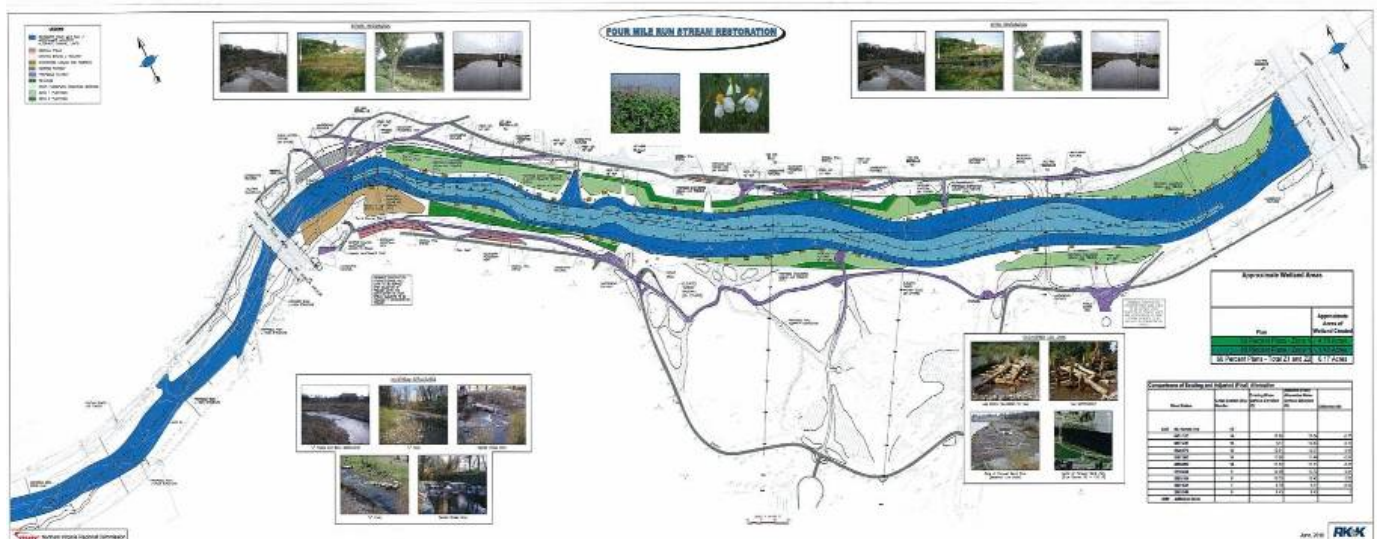
This single objective flood control project has succeeded in its intended purpose—no floods have occurred along the 2.3 mile channel since its construction. However, the project design did not address ecology, recreation, aesthetics, and urban design in any substantive way.

As a result, citizens and staff from Arlington County and the City of Alexandria, the US Army Corps of Engineers (USACE), the Northern Virginia Regional Commission (NVRC), and Congressman Jim Moran's Office have been coordinating an effort for environmental restoration and urban planning focused on the flood control project.

In November 2004, the City and County, using \$1 million appropriated by Congress, hired a consulting team to develop an overall master plan for the restoration of this corridor. This extensive inter-jurisdictional, multi-agency effort reached a key milestone in March 2006 with adoption of the master plan by both Arlington County and the City of Alexandria.

The first step in master plan implementation is streambank and wetland restoration along the tidal portion of the corridor. The 90% designs for the project were completed during FY 2011.

Arlington and Alexandria are currently working closely with NVRC and USACE to obtain Congressional re-authorization of the project design flow to allow the project to proceed to construction. The timing for this Congressional action is uncertain.



*Four Mile Run tidal corridor stream restoration plan*

## Reduction in NOx emissions

The Chesapeake Bay Program model estimates that up to 30 percent of the nitrogen loadings to the Bay are in the form of atmospheric deposition of nitrogen oxides (NOx). Although not a 'stormwater retrofit' in the traditional sense, Arlington County's nationally-recognized programs to encourage 'smart growth,' with dense development around mass transit stations, significantly reduce vehicle miles traveled and the associated NOx emissions (as well as other automotive-related pollutants). While modeling the deposition of atmospheric pollution is a complicated science, the County is confident that these NOx reductions in Arlington provide positive benefits for the Bay and its tidal tributaries.

In addition, Arlington County continues to implement a number of changes to its vehicle fleet that specifically reduce air pollution and NOx emissions, including ongoing replacement of fleet vehicles with hybrid vehicles.

Through FY 2012, the County has replaced 166 vehicles in its fleet with hybrid vehicles. These vehicle replacements reduce NOx emissions from vehicle tailpipes by 10 lbs. to 20 lbs. per vehicle per year, resulting in an estimated reduction of more than 1 ton of annual NOx emissions.

These NOx reduction estimates should be considered planning level estimates and may be refined as better quantification and modeling tools become available to estimate reductions as well as delivered loads to the Bay and its tidal tributaries. Nonetheless, implementation of 'smart growth' development policies and replacement of fleet vehicles is clearly consistent with a holistic approach to regional NOx reductions and has both air quality and water quality benefits.

It is important to recognize that there are not many places in the County where the land area and funds exist to install stormwater BMPs that can treat a large amount of impervious area and remove nitrogen, which typically occurs through anaerobic processes. County staff believes that the significant stormwater management challenges in urban areas require the use of a variety of tools to achieve both local watershed goals as well as the goals of the Chesapeake Bay program. Where the County can realize the dual benefits of meeting its obligations under the Chesapeake Bay Program and its obligations under the Clean Air Act for improving regional air quality, these opportunities will continue to be explored.

#### **E. Pesticide, Herbicide and Fertilizer Application**

| Summary of program                         |                   |
|--|-------------------|
| Program element                            | Responsible party |
| Approved products and application training | DPR               |
| Water Quality Agreement with DCR           | DPR               |

The following excerpt from Arlington County's Natural Resources Management Plan, completed in July 2005, describes DPR's use of Integrated Pest Management (IPM) principles for landscape maintenance:

*DPR's Parks and Natural Resources Division follows an Integrated Pest Management (IPM) approach when maintaining landscape areas. This involves selection of environmentally responsible treatment options, that include mechanical, biological and chemical alternatives to treat pests when they have reached potentially damaging levels. Applications are targeted to control the problem at a given location, using the appropriate material. For herbicide applications, spot treatments with Round-Up are done on individual weeds or patches of weeds (such as poison ivy), rather than blanket spraying of large areas. Insecticides and fungicides are applied in the greenhouse and rose garden when the pest*

*has been identified as a problem. Our landscape staff routinely hand-weeds landscape beds, however, time and resources would not allow for hand-pulling of all weeds along curbs, gutters and sidewalks. A pre-emergent herbicide is sometimes used during landscape bed preparation, but this helps to limit the need for future spraying and weeding later in the growing season.*

Alternatives to pesticides are also employed when practical. For example, recent improvements to the Bon Air Memorial Rose Garden include the use of perennial plants that contribute to the garden's health by attracting beneficial insects that feed on rose garden pests.

In addition, as described in Arlington County's original MS4 Permit application, the County continues to maintain a list of approved pesticide and herbicide products and uses for public rights-of-ways, parks, and other municipal property. Staff using these chemicals are certified and receive ongoing training on safe handling and proper application. Chemicals are stored in sheds with trays used to contain leaks and spills. When applying chemicals, County employees follow labeling instructions. The County also tracks the amount of chemicals used.

A spray concentrations chart provided to staff to ensure proper mixing of herbicides was provided as Appendix D to Arlington's 2007 permit renewal application as an example of the training materials used.

In addition, in March 2005, the Sports Division of the County's Parks, Recreation, and Cultural Resources signed a Water Quality Agreement with Virginia DCR that addresses the minimization of water quality impacts from the use of turf fertilizers.

## **F. Illicit Discharges and Improper Disposal**

| <b>Summary of program</b>             |                               |
|---------------------------------------|-------------------------------|
| <b>Program element</b>                | <b>Responsible party</b>      |
| Pollution prevention                  | DES/OSEM; ACFD                |
| Response to illicit discharge events  | ACFD; DES/OSEM and DES/OD/WSS |
| Dry weather screening                 | DES/OSEM and DES/OD/WSS       |
| Floatables control                    | DES/OD/SWB                    |
| Infiltration/inflow program           | DES/OD/WSS                    |
| Household hazardous materials program | DES/OD/WPCB                   |
| Automotive business inspections       | ACFD                          |
| Legal authority                       | ACFD; DES/OSEM                |

Arlington County's experience is that the vast majority of illicit discharges are transient in nature (e.g., paint, wash water, or concrete dumping) and unlikely to be detected by random outfall screening, including sampling. The substantial base flow present in most major storm sewer outfalls and the large upstream drainage area further decrease the probability of detection - even when sampling takes place during an illicit discharge event.

Arlington County exceeded the dry weather screening requirements during its first permit term by conducting colorimeter tests at all major outfalls, rather than just those suspected of receiving illicit discharges. In addition, staff visually inspected all major outfalls each year of its first permit term and worked with NVRC to conduct optical brightener monitoring at all outfalls in the Four Mile Run watershed (more than 60 percent of the County). Staff conducted follow-up inspections and testing at outfalls of concern, and these activities have been reported in prior annual reports.

Since the issuance of the County's first permit and the initiation of dry weather screening, only a handful of chronic illicit discharges (all sanitary sewer cross connections) have been discovered and all of these cases were subsequently corrected.

### **Pollution prevention**

Given the extensive dry weather screening activities that the County has undertaken to date, the few chronic illicit discharges found, and the low probability of detecting an illicit discharge, the County has shifted its focus to targeted pollution prevention efforts for particular business sectors. County staff continue to conduct illicit discharge response and follow-up, targeted screening, and enforcement actions when necessary.

Pollution prevention activities in FY 2012 include:

- Working to ensure that all vehicle washing operations in the County operate in compliance with the County's MS4 permit and State VPDES regulations. The County continues to check on reports of non-stormwater discharges from establishments that wash vehicles and work with VA DEQ to issue VPDES General Permits for Car Washing when discharges are a source of significant pollutants and cannot be directed to the sanitary sewer.
- Working to ensure that discharges from swimming pools and large ornamental fountains operate in compliance with the County's MS4 permit and State VPDES regulations.
- Working to ensure that discharges from construction site dewatering operations at petroleum contaminated sites are regulated by a General VPDES Permit operated in accordance with 9 VAC 25-120-10 et seq.
- Inspecting gas stations and other automotive-related facilities for hazardous materials use, storage, and disposal, as described in Section F.
- Inspecting restaurants to ensure housekeeping is being conducted for outdoor storage areas and used grease and other materials are properly stored.
- Responding to and following up on resident calls and emails concerning pollution releases from businesses or residential areas (runoff from outside washing activities, leaking dumpsters or grease containers, dumping, and sediment runoff from construction sites).
- Developing and distributing stormwater pollution prevention education and outreach materials for residents and businesses.
- Providing technical assistance to individuals and businesses on appropriate stormwater pollution prevention measures for outdoor cleaning activities.



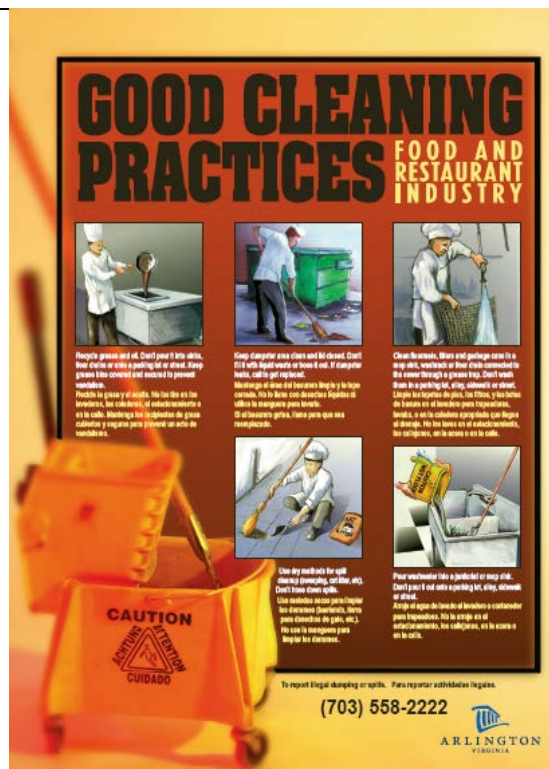
The County continued to distribute educational posters to restaurants and to automotive-related businesses detailing pollution prevention best practices. Outreach materials are provided to paint distributors to educate painting contractors on proper disposal of paints, and cleaning brushes. Postcards about proper disposal of pet waste continued to be distributed. Information from the postcards was provided to several volunteer community organizations that advocate for responsible dog ownership. The postcard was enlarged and placed in kiosks at community canine areas.

Staff continued to distribute stormwater pollution prevention packets for businesses, including fact sheets covering specific maintenance activities that can contribute to water pollution and ways to prevent pollution. Topics include pressure washing, painting, parking lot management, dumpster management, surface treatments, outdoor storage, equipment maintenance, landscaping and grounds maintenance, and food handling. The packet also includes a pollution prevention inspection checklist to help businesses identify potential sources of pollution and a resource list with sources of stormwater pollution prevention products. The information packets are provided to businesses during illicit discharge investigations and corresponding follow-up notifications.

Examples of outreach materials are displayed below. Additional outreach efforts targeting pollution prevention actions by homeowners are described in Section K.



*Automotive business pollution prevention poster*



*Restaurant business pollution prevention poster*



**Illicit discharge response**

The Fire Department is the initial responder for most illicit discharge events, including spills, usually dispatched through the County's Emergency Communications Center. If the Fire Department Hazardous Materials Team determines the discharge consists of a hazardous substance or is intentionally discharged (environmental crime), additional follow-up through the Fire Marshal's office occurs. Non-hazardous discharges are referred to the appropriate agency (e.g., sanitary sewage releases to the DES Water, Sewer, Streets Bureau; erosion/sediment control issues to DES, etc.). Illicit discharges that do not fall into one of these categories are generally investigated jointly by DES/OSEM and the Fire Marshal's office.

Illicit discharge reports and investigations conducted in FY 2012 are summarized in the table below.

| Receiving Water body | Discharge Description | Discharge Source | Incident Summary  |
|----------------------|-----------------------|------------------|---|
| Rocky Run            | Fuel                  | Unknown          | Hydrocarbon product was discharged to the Potomac River from the Rocky Run watershed. Source believed to be diesel fuel spill (roof top) at 3000 Wilson Blvd. Emergency personnel and clean up contractor responded to discharge. |
| Lower Long Branch    | Sewage                | Pipe Break       | Broken lateral caused sewage to seep up through asphalt. Street excavated and   |

| Receiving Water body           | Discharge Description | Discharge Source           | Incident Summary   |
|--------------------------------|-----------------------|----------------------------|--|
|                                |                       |                            | lateral repaired.  |
| Upper Long Branch              | Unknown               | Other                      | Resident contacted FD about observing dark water in stream. FD and OSEM responded. Water clear in stream, test results were normal. Dark algae on stream bottom gave water a dark appearance. Investigated possible nutrient input.                                      |
| Arlington Forest Branch        | Trash                 | Dumping                    | Resident reported dumping / poor housekeeping (food dumping, outside washing, leaking dumpster) at restaurant. OSEM and FM responded.  |
| Four Mile Run Middle Main stem | Hydraulic Oil         | Spill                      | Hydraulic oil spilled out of old lift system that was removed from the Equipment Bureau. Spill flowed across parking lot and into storm drain. Absorbent materials put down and booms placed in stream below outfall. Site cleaned up. Discharge not observed in stream. |
| Four Mile Run Middle Main stem | Sediment / Petroleum  | Spill / Equipment Fire     | Tub grinder at SWB caught on fire. Runoff from fire fighting, which included mud, mulch, and petroleum product, flowed into storm drain and into FMR. Absorbent booms deployed to catch product.   |
| Roaches Run                    | Sewage                | Overflow from blocked line | A blockage in a private lateral for a business resulted in a sewage backup. Plumber cleared line and cleaned up discharge.   |
| Spout Run                      | Trash                 | Wash water                 | DES inspector observed an employee of an establishment washing dumpsters by a storm drain. The inspector informed the individual the action was not permitted. NOV issued.   |
| Gulf Branch                    | Concrete              | Construction Activity      | Gulf Branch Nature Center reported white / gray substance in stream. Source tracked to concrete work at single family home construction site in watershed.   |
| Doctor's Branch                | Sewage                | Overflow                   | Sewage tank overflow. Site cleaned up, lime used for odor control. Company installed additional system capacity  |
| Four Mile Run Middle Main stem | Milky                 | Dumping                    | WSS received report of white / gray milky substance coming out of an outfall into FMR near S Walter Reed Dr crossing. FD / OSEM responded, weak base detected. No hazard material detected. Slug discharge, possible wash water / construction debris dumping.           |

| Receiving Water body              | Discharge Description | Discharge Source      | Incident Summary   |
|-----------------------------------|-----------------------|-----------------------|--|
| Palisades                         | Sewage                | Pipe Break            | A 4-inch sanitary force main broke as a result of the earthquake. Sewage leaked into a joint of an adjacent storm sewer pipe. The discharge was stopped by vacuuming the sewage from the storm manhole until the bypass was set up. A temporary repair was completed. Main will be replaced. |
| Lubber Run                        | Sediment              | Construction Activity | Construction workers observed washing mud off equipment, construction entrance / wash rack was filled and clogged. Wash water ran off site and entered street and storm sewer. DES inspector responded and required clean up and controls.   |
| Four Mile Run<br>Middle Main stem | Concrete / wash water | Construction Activity | Contractor washed concrete truck chute into roll over container. Spray, overflow, and leaking occurred. Wash water and concrete ran off into storm drain. Contractor cleaned up area.  |
| Little Pimmit Run,<br>West Branch | Oil                   | Equipment Leak        | Resident reported oil leaking onto the street from construction vehicles and trucks staged at an intersection. Contractors required to clean up oil and move / repair vehicles.  |
| Rocky Run                         | Sediment              | Construction Activity | County employee reporting seeing muddy runoff coming from large construction site. DES inspector followed up and issued NTC  |
| Donaldson Run                     | Sediment              | Construction Activity | Resident reported muddy runoff coming from single family home construction site (new water service installation). DES inspector investigated site. Contractor need to maintain erosion and sediment controls.  |
| Four Mile Run<br>Middle Main stem | Foam/Suds             | Unknown               | Staff observed significant foam and slight odor in storm drain while conducting watershed assessment. WSS crew dispatched to check for cross connection. Source not found.   |
| Four Mile Run<br>Upper Main stem  | Sewage                | Overflow              | Sanitary sewer surcharge (hydraulic overload of collection system) to Four Mile Run at MH 3888 resulted from high water during 9/8/11 storm event. Dislodged cover found on 09/20/2011. WSS to bolt down cover.  |
| Four Mile Run<br>Upper Main stem  | Sewage                | Overflow              | Sanitary sewer surcharge (hydraulic overload of collection system) to Four Mile Run at MH 666 as a result of high  |

| Receiving Water body          | Discharge Description   | Discharge Source      | Incident Summary  |
|-------------------------------|-------------------------|-----------------------|---|
|                               |                         |                       | water during 9/8/11 storm event. Manhole cover completely displaced from frame.   |
| Four Mile Run Upper Main stem | Sewage                  | Overflow              | Sanitary sewer surcharge (hydraulic overload of collection system) to Four Mile Run at MH 12760 as a result of high water during 9/8/11 storm event. Manhole cover displaced from frame. WSS will bolt down cover   |
| Four Mile Run Lower Main stem | Sewage                  | Overflow              | Sanitary sewer surcharge (hydraulic overload of collection system) to Four Mile Run at MH 12396 as a result of high water during 9/8/11 storm event. Manhole cover and frame displaced from concrete riser. WSS will replace frame and cover.                   |
| Four Mile Run Lower Main stem | Chemical / dirt / paint | Wash water            | Auto repair establishment pressure washing / cleaning out bays and sumps; pumping dirty water to sidewalk and runoff entered the storm sewer. ACFD responded to incident and issued NOV. DES also issued NOV.   |
| Lubber Run                    | Sediment                | Construction Activity | Resident reported sediment coming from outfall into Lubber Run. Source of sediment was construction activity (dewatering and tracking) in the watershed. DES inspector issued NTC.  |
| Four Mile Run Upper Main stem | Paint                   | Dumping               | Resident contacted ECC to report an individual dumping a bucket of paint into a storm drain along Williamsburg Blvd. ACFD Hazardous Material Team, FM, and DES investigated. Responsible party not identified.  |
| Lubber Run                    | Paint                   | Spill                 | Resident report. A one gallon can of white latex paint on the road along the curb line was hit by a vehicle. Paint was released and carried by storm runoff to nearby storm drain. WSS and SWB contacted to assist with cleanup. Owner of paint not identified. |
| Windy Run                     | Sewage                  | Overflow              | Sanitary sewer overflow at pump station caused by malfunctioning pump. Immediate action was taken to start additional pumps and the overflow was stopped.   |

| Receiving Water body              | Discharge Description       | Discharge Source       | Incident Summary  |
|-----------------------------------|-----------------------------|------------------------|---|
| Four Mile Run<br>Middle Main stem | Wash water /<br>Auto Fluids | Wash water             | During watershed assessment, County staff observed poor housekeeping and evidence of discharge to the street. Verbal warning issued. Follow up NOV letter and pollution prevention education materials issued.  |
| Four Mile Run<br>Middle Main stem | Trash / Grease              | Dumping                | During watershed assessment, County staff observed poor housekeeping and evidence of dumping and indirect discharge. Follow up NOV letter and pollution prevention education materials to be issued.            |
| Four Mile Run<br>Upper Main stem  | Petroleum                   | Unknown                | FS 106 reported rainbow sheen in FMR. Booms placed in stream to absorb sheen. No hazardous substance identified by detection and monitoring, slight fuel oil odor detected. Source of discharge not identified. |
| Spout Run                         | Sediment                    | Construction Activity  | Sediment discharge from construction entrance wash rack. Water from wash rack was not being filtered. NTC / NOV issued by DES inspector.  |
| Four Mile Run<br>Middle Main stem | Sediment                    | Construction Activity  | Sediment in street from construction activity was washed into the storm sewer as a result of a hydrant opening to test fire flows. DES inspector followed up and had street cleaned up by contractor.           |
| Four Mile Run<br>Lower Main stem  | Sewage                      | Other / Line surcharge | Air vent/bleed line discharged return activated sludge onto the ground at WPCP, 20-30 gallons entered onsite storm drain and Four Mile Run.   |
| Four Mile Run<br>Middle Main stem | Grease                      | Indirect Runoff        | Grease discharge from poor housekeeping / inadequate used grease storage at restaurant. PM to clean up site, replace grease containers.   |
| Four Mile Run<br>Middle Main stem | Dye                         | Plumbing work          | Tracer dye released to Four Mile Run as a result of plumbing contractor checking garage floor drains at multi-family dwelling. Follow up letter sent to Facilities Director.                                    |
| Lubber Run                        | Milky                       | Unknown                | Resident observed unknown white substance in Lubber Run. Resident did not contact ECC, email and photo notification provided to OSEM via email. Source not found.   |



| Receiving Water body              | Discharge Description | Discharge Source | Incident Summary   |
|-----------------------------------|-----------------------|------------------|--|
| Four Mile Run<br>Middle Main stem | Wash water / grease   | Wash water       | Illicit discharge observed behind establishments at Village of Shirlington, discharge included wash water from grease storage cleaning, leaking dumpster, food dumping. NOV issued.                |
| Lubber Run                        | Unknown               | Unknown          | Resident reported seeing white milky substance in Lubber Run. Source not identified.   |
| Spout Run                         | Petroleum             | Unknown          | FD responded to gas odor near stream during heavy rain event. Chemical classifier strip indicated presence of petroleum product. Source not identified, may have been road runoff from heavy rain. |
| Colonial Village Branch           | Dumpster leachate     | Indirect Runoff  | Resident report petroleum odor and leachate from a leaking dumpster running off into the street and storm drain. Reported to ACFD. DES staff to follow up with second site visit and NOV letter.   |
| Little Pimmit Run,<br>West Branch | Paint                 | Spill            | Resident reported milky white substance in stream. Source identified as white latex paint that was accidentally dropped from a contractor's truck. Some of the paint got into the storm drain.     |
| Nauck Branch                      | Petroleum             | Unknown          | ACFD responded to oil in stream. Booms deployed and clean up contractor removed product.   |
| Nauck Branch                      | Fuel                  | Spill            | Business employee hosed down spilled fuel in parking lot. Discharge went into street and nearby CB. Discharge observed by County staff. NOV issued by Fire Marshal.                                |
| Four Mile Run<br>Upper Main stem  | Wash water            | Dumping          | Contractor dumped a garbage can full of wash water from floor cleaning operation in storm drain. ACFD responded and issued NOV.  |
| Four Mile Run<br>Middle Main stem | Sewage                | Pipe Break       | Sanitary sewer main was broken as a result of construction activity. Discharge entered storm drain. WSS flushed line to stop discharge and repaired the line.                                      |
| Nauck Branch                      | Foam/Suds             | Wash water       | Discharge from washing delivery trucks at loading dock area entered storm drain.   |
| Four Mile Run<br>Upper Main stem  | Dye                   | Dye Testing      | City of Falls Church conducted dye testing.  |

| Receiving Water body              | Discharge Description | Discharge Source      | Incident Summary   |
|-----------------------------------|-----------------------|-----------------------|--|
| Four Mile Run<br>Middle Main stem | Hydraulic Fluid       | Equipment Leak        | Hydraulic line on waste collection truck broke and hydraulic fluid was released to alley and trench drain for loading dock. Fluid was blocked by debris in drain. Absorbent materials put down and area / drain cleaned out. No release to surface waters. |
| Little Pimmit Run,<br>West Branch | Sediment              | Unknown               | Resident reported that Little Pimmit Run (west Branch culvert) was clay colored and opaque. Source not determined.   |
| Four Mile Run<br>Lower Main stem  | Sewage                | Pipe Break            | Broken 8" sanitary sewer line caused backup and overflow from manhole. Discharge entered nearby CB. WSS repaired line and stopped discharge.   |
| Rocky Run                         | Sewage                | Overflow              | Blockage and back up in private sanitary system for Odyssey Condominium resulted in discharge from clean out to N Scott St and to CB. Property management company called plumber to clear block and clean site.  |
| Windy Run                         | Sediment              | Spill                 | Dump truck spilled load of dirt along Military Road. Cars tracked material down road. Rain carried dirt to storm drain. WSS / SWB crews responded to help clean up / remove dirt from road.  |
| Lubber Run                        | Grease                | Spill                 | Resident reported spilled grease / used cooking oil in the alley behind closed down restaurant. Contents of 55 gallon drum were spilled. Drum had been removed already. SWB cleaned up spill. FM investigating.  |
| Spout Run                         | Petroleum/Sheen       | Wash water            | Resident reported oily discharge coming from auto dealership to street and storm sewer. County staff investigated. NOV issued for discharge, VPDES permit needed for car washing activities.   |
| Gulf Branch                       | Sediment              | Construction Activity | Nature Center staff reported cloudy water in Gulf Branch. Source was sediment from a water service being put in at a new single family home. Inspector spoke with workers about sediment control.  |
| Lower Long Branch                 | Sewage                | Pipe Break            | WSS crew found leaking sanitary main resulting from root intrusion while following up on a resident concern about unusual odor near stream. Temporary pump around put in place and main to be re-lined.  |

| Receiving Water body              | Discharge Description | Discharge Source      | Incident Summary  |
|-----------------------------------|-----------------------|-----------------------|---|
| Lower Long Branch                 | Sewage                | Pipe Break            | Sewage leak from different section of damaged main from previous week. Discharge ceased, pump around set up, main to be relined.  |
| Spout Run                         | Grease                | Spill                 | Used grease container overflowed and discharged into drain in loading dock behind restaurant. Discharge went to on-site SWM facility. Plumber called to clean out facility. Residual grease did enter storm sewer via on site detention system.                   |
| Little Pimmit Run, West Branch    | Concrete              | Construction Activity | Poor ESC and concrete dumping at SFH construction site. Evidence of ID to CB on 35th St N. Site inspector notified. RLD notified to clean site and maintain ESC. NOV / ticket sent to RLD.  |
| Four Mile Run<br>Middle Main stem | Milky                 | Unknown               | FD responded to report of unknown white substance entering FMR from concrete outfall. Discharge had stopped by the time ACFD staff arrived. Discharge tested, no hazardous material detected. Discharged believed to be water based white paint or grout.         |
| Little Pimmit Run, West Branch    | Foam/Suds             | Unknown               | Resident reported presence of suds in stream coming from culvert under Old Dominion Dr. OSEM investigated and found that discharge had ceased. No hazardous materials detected. Source not found.   |
| Lubber Run                        | Milky / Suds          | Unknown               | Resident called FD to report unknown milky sudsy substance coming out of an outfall into Lubber Run. Discharge looked like wash water. Slug discharge, stopped by the time ACFD arrived. Happened previous two mornings according to residents. Source not found. |
| Fairlington / Bradlee             | Turbid / Auto Fluids  | Wash water            | FM issued NOV to gas station washing down area around service bays. Wash water discharge entered storm sewer system.  |
| Rocky Run                         | Foam/Suds             | Wash water            | Discharge of soapy, dirty wash water to storm drain from contractor power washing courtyard area. County staff spoke to contractor about issue. Written follow-up to property manager about incident.   |

| Receiving Water body              | Discharge Description | Discharge Source      | Incident Summary  |
|-----------------------------------|-----------------------|-----------------------|---|
| Four Mile Run<br>Middle Main stem | Sewage                | Overflow              | Trees roots caused blockage and overflow from sanitary MH, overflow crossed bike trail and entered FMR. WSS cleared blockage and discharge ceased.  |
| Four Mile Run<br>Middle Main stem | Turbid                | Wash water            | Discharge of wash water / debris to storm sewer from auto service center washing cars / detail work in bay. Water entered street and flowed into storm drain.   |
| Lower Long Branch                 | Concrete              | Construction Activity | ACFD staff observed contractor washing out and dumping wash water concrete / paint buckets in street by a storm drain.  |
| Crossman Run                      | Paint                 | Construction Activity | Resident contacted FD to report paint being discharged from SFD from sump pump drain into street and storm drain, ACFD responded. NOV letter issued to property owner.  |
| Four Mile Run<br>Upper Main stem  | Unusual Color         | Unknown               | FD dispatched for white substance in FMR. Substance resembled paint. Source of discharge not found. Booms placed in stream.   |
| Palisades                         | Foam/Suds             | Unknown               | ACFD dispatched to outfall discharging suds by Roosevelt Island. No hazardous materials detected. Source not found.   |
| Rocky Run                         | Sewage                | Overflow              | Discharge of sewage from a 10" sanitary sewer to the roadway. Discharge resulted from blockage of rocks and dirt in line. Frame and cover had been knocked off of the manhole in the construction area causing the dirt and rocks to get inside the line. Line cleaned and put back in service. |
| Nauck Branch                      | Concrete              | Construction Activity | Overflow of concrete caulk from patch work being conducted by Washington Gas contractor. WG contacted about discharge.  |
| Little Pimmit Run,<br>East Branch | Unusual Color         | Unknown               | Resident observed and reported white substance in stream coming from outfall in Rock Springs Park. Source not found.  |
| Four Mile Run<br>Lower Main stem  | Sewage                | Spill                 | Small amount of sewage was spilled when a truck was unloading at the WPCP waste pad. The sewage spilled into an adjacent storm drain.   |
| Rosslyn                           | Foam/Suds             | Unknown               | Suds were observed coming out of the outfall by the parking lot for Roosevelt Island.   |
| Four Mile Run<br>Middle Main stem | Sewage                | Cross connection      | Private sanitary lateral cross connection found while investigating resident complaint about murky water and odor near outfall. Building owner contacted  |

| Receiving Water body           | Discharge Description | Discharge Source      | Incident Summary  |
|--------------------------------|-----------------------|-----------------------|---|
|                                |                       |                       | and repair to be made. NOV issued.  |
| Little Pimmit Run, East Branch | Oil                   | Dumping               | Resident contacted FD about petroleum odor in park. FD / OSEM investigated - unknown petroleum product entered stream from outfall in Rock Spring Park. Booms deployed. Source not identified.  |
| Four Mile Run Middle Main stem | Foam/Suds             | Wash water            | Resident reported discharge of wash water from auto body shop. Site investigated, NOV letter sent to manager.   |
| Roaches Run                    | Grease                | Wash water            | Runoff from cleaning activities at Costco loading dock / dumpster / used grease storage container staging area. Sludge and standing water observed along curb line. Spoke with asst manager. Area cleaned up.   |
| Spout Run                      | Wash water            | Wash water            | Staff observed evidence of outdoor washing behind restaurant, discharge went to storm sewer system. Staff spoke to manager about issue. NOV issued.   |
| Lubber Run                     | Unusual Color         | Unknown               | ACFD was dispatched to investigate unknown white substance in Lubber Run. Discharge had ceased when FD arrived. FD personnel thought it might be white paint wash out. Source not found.  |
| Gulf Branch                    | Potable water         | Dewatering            | Discharge of potable water from draining 36" water main to storm sewer resulted in fish kill.   |
| Gulf Branch                    | Concrete              | Construction Activity | GBNC staff received report of milky water in stream at intersection of Dittmar Rd and 37th Rd N. Source was determined to be removal of block IP and slurry from pavement cutting entering storm drain. Contractor notified of issue and told to clean up site. |
| Lower Long Branch              | Sediment              | Water Main break      | Water main leak discharged sediment and drinking water to catch basin. ANGK reported muddy water in stream. Main repaired.  |
| Gulf Branch                    | Sediment              | Water Main break      | Water main break discharged drinking water and sediment to catch basin 261 on N Stafford St. Main repaired.   |

OSEM staff continues to use the Illicit Discharge Information Tracking System (IDITS) database to track discharges and pollution releases to the County's MS4 and surface waters. The record keeping system stores information on all reported incidences including receiving agency, location of discharge, discharge description, ACFD/DES response and follow-up actions,

sampling, business contact information, enforcement actions, and incident status. Staff can track and update the status of follow-up activities including investigations and enforcement actions taken for each incident. The system is used to analyze trends or patterns when investigating reoccurring incidents.

**Illicit Discharge Information Tracking System**

File Edit View Insert Format Records Tools Window Help Adobe PDF

Main Switchboard

**Illicit Discharge Information Tracking System**

☐ Add Record  
☐ View Records  
☐ Quit

ARLINGTON VIRGINIA

**IDITSepo**

General Info ACFD Input Business Info EPO Follow-up

Rec ID 48 Web RecID Report Receiving Agency ACFD

Incident Report Date 07/31/2008 Incident Report Time 08:00

Incident Street Number 1001 Street Name N KENNEBEC ST

City Arlington State VA Zip 22205

Additional Location Info Outfall next to bike path under I-66 (near Westover Park) Corner of N Kennebec and Fairfax Dr Incident Location Outfall

Enter Storm Sewer Yes Enter Stream Yes Fish Macro Kill ☐

Stream Name Watershed Four Mile Run Upper Mainstem 2 Weather Conditions Clear

Discharge Description Sewage Description Other Porta-john waste

Discharge Color Blue Discharge Odor Sewage Discharge Volume ~1000 gallons

Reason for Release Dumping Reason Other

Comments Remarks ACFD received call about strong odor, appeared to be dumping of contents of portable lavatory service truck. WSS responded w/ vac truck to remove contaminated water. FD and EPO investigated surrounding area

RPC 09069012 Map Number 51 SE X Coordinate 11871176 Y Coordinate 7006231

ACFD Response E101M, R109, HM101, E103M, DTYFM Web Timestamp Added 08/05/2008 3:27:32 PM

Record: 46 of 53

Form View NUM

start Inbox - Microsoft Out... Illicit Discharge Infor... Main Switchboard IDITSepo 8/5/08 2:04 PM

An online report form where ACFD first responders can submit information on unauthorized releases to the County's storm sewer system or surface waters is in the process of being updated. The information submitted is added to the IDITS database. This reporting mechanism provides a way to track discharges that result from vehicular accidents or leaks found during fire marshal inspections. These discharges are more difficult to track since the discharge is not the primary focus of the initial response or investigation and may not be reported to DES.



### Dry weather screening program

The two dry weather screening program activities that continued in FY 2011 are described below.

#### TV inspection

The County's storm sewer TV inspection program is a comprehensive dry weather screening tool that is more effective for identifying illicit connections than simple visual observations or random chemical sampling at major storm sewer outfalls. The inspection videos produced from this program are reviewed not only for maintenance assessment but also for potentially suspicious connections that could represent an illicit connection. As with visual inspection/random chemical sampling, however, the probability of finding an episodic discharge (versus a chronic cross connection) is low with this method.

Since the program's inception in FY 2002, over 90% of the County's 360 mile storm sewer system has been inspected. Only a very small number of potentially suspicious connections have been identified since the beginning of this program. Those already investigated have been determined to be drainage connections.

#### Bacteria sampling

Starting in October 2005, volunteers began monitoring E. coli bacteria levels at 10 locations in Four Mile Run. Since 2005, five additional sites have been added.

- Donaldson Run. Two Donaldson Run sites were added for hotspot detection purposes and to gather data on the newly restored Tributary A. (DR upper, restored and DR lower, unrestored)
- Lubber Run. A subwatershed of Four Mile Run (Site 5a).
- Lower Four Mile Run. This site is adjacent to the Shirlington dog park in the Lower Four Mile Run Mainstem (Site 9a).

Monthly samples are collected and analyzed using the Coliscan EasyGel method. The program, which is endorsed by Virginia DEQ, is intended to identify bacterial hotspots for further investigation, and supports both the illicit discharge requirements of this permit and the requirements of the Four Mile Run bacteria TMDL.

| Sampling Locations |   |  |
|--------------------|---|--|
| Site No.           | General location  | Watershed location   |
| 1                  | Benjamin Banneker Park, just downstream from Van Buren St.        | Upper Four Mile Run  |
| 2                  | East Falls Church Park (N. Roosevelt St)                          | Upper Four Mile Run  |
| 3                  | Bluemont Park   | Below confluence of small tributary that flows from under I-66 near N. Kennebec St |
| 4                  | Glencarlyn Park, near N. Carlin Springs Rd. and N. Kensington St. | Above confluence of Lubber Run tributary and Four Mile Run                         |

| Sampling Locations              |                          |  |
|---------------------------------|--------------------------|--|
| 5                               | Glencarlyn Park          | Below confluence of Lubber Run tributary and above confluence of Upper Long Branch tributary and Four Mile Run |
| 5a                              | Lubber Run Park          | Lubber Run, just downstream of N. 4 <sup>th</sup> Street   |
| 6                               | Glencarlyn Park          | Upper Long Branch tributary above dog park   |
| 7                               | Glencarlyn Park          | Below confluence of Upper Long Branch tributary and Four Mile Run  |
| 8                               | Glencarlyn Park          | Below confluence of small tributary near 7th St. South   |
| 9                               | Barcroft Park            | Below confluence of Doctor's Branch tributary and Four Mile Run  |
| 9a                              | Shirlington Dog Park     | Lower Four Mile Run  |
| 10                              | Troy Park                | Lower Long Branch tributary just above the confluence with Lower Four Mile Run                                 |
| 11                              | Mt. Vernon Avenue Bridge | Tidal portion of Lower Four Mile Run   |
| Upper, restored Donaldson Run   | Zachary Taylor Park      | Above Military Rd, above the confluence of tributaries B and C   |
| Lower, unrestored Donaldson Run | Zachary Taylor Park      | Below Military Rd and next to N. 30 <sup>th</sup> Street, below the tributary confluences of tributaries B & C |

### *Summary of bacteria monitoring locations*

From the beginning of the program in October 2005, through June 2012, 751 samples have been collected at the 15 sampling locations. Between July 1, 2011, through June 30, 2012, 149 samples were collected. Of these, 37 (25%) exceeded the primary contact recreation water quality standard, and 5 samples (3%) exceeded the secondary contact recreation standard<sup>1</sup>. Of the data submitted from the 15 monitoring stations:

- Three stations did not have any water quality exceedances (20% of stations).
- Five stations had one exceedance (33% of stations).
- Stations 2, 5 and 10 had 54% of the exceedances (20 exceedances).
- Of the 37 primary exceedances, 14% were within 40 colonies of the 235 colonies/100 ml.

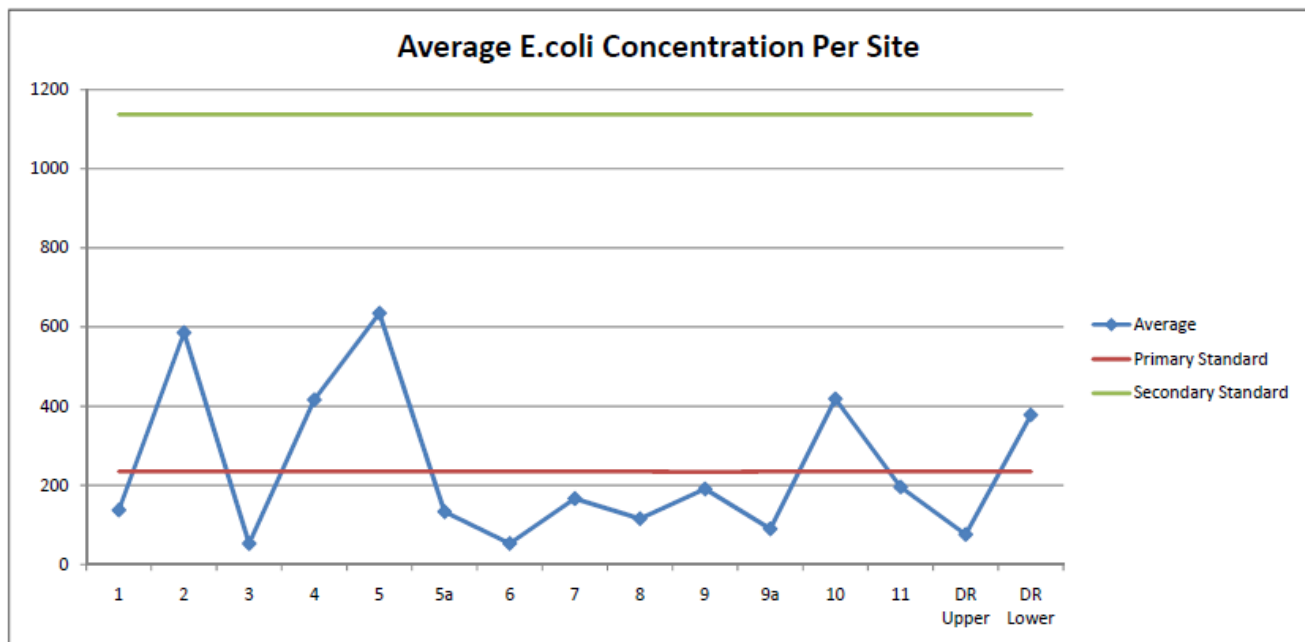
<sup>1</sup> The actual calculation of exceedance frequency for regulatory purposes is more complex and is not presented here.

| Site Number                  | 1   | 2   | 3  | 4   | 5    | 5a  | 6  | 7   | 8   | 9   | 9a  | 10  | 11  | Upper DR | Lower DR |
|------------------------------|-----|-----|----|-----|------|-----|----|-----|-----|-----|-----|-----|-----|----------|----------|
| Average Concentration        | 138 | 586 | 53 | 416 | 635  | 133 | 53 | 167 | 116 | 191 | 90  | 419 | 196 | 76       | 378      |
| Standard Deviation           | 162 | 811 | 80 | 80  | 1001 | 329 | 86 | 155 | 158 | 195 | 182 | 569 | 290 | 98       | 984      |
| Exceedances of primary WQS   | 2   | 8   | 0  | 0   | 5    | 1   | 0  | 4   | 1   | 3   | 1   | 7   | 3   | 1        | 1        |
| Exceedances of secondary WQS | 0   | 1   | 0  | 0   | 2    | 0   | 0  | 0   | 0   | 0   | 0   | 1   | 0   | 0        | 1        |

*Summary of E. coli bacteria sampling data<sup>2</sup>*

The availability of the secondary contact standard, even if not currently applicable to Four Mile Run, is valuable. It allows the County to evaluate the suitability of Four Mile Run for secondary contact recreation. The County's guidance to its citizens for safe use of streams follows allowable secondary contact activities, and the data collected to date support the safety of Four Mile Run for these activities.

As noted above, Sites 2, 5, and 10 are responsible for 54% of the total exceedances. The average E. coli concentrations between July 2011 and June 2012 for these three sites are also noticeably higher than the other sites (see figure below). The elevated average for Donaldson Run's lower segment is due to one high sample out of the nine total, collected samples. Without that single sample, the average concentration for Donaldson Run's lower segment would be 50 colonies/100 ml.



<sup>2</sup> Volunteers do not count above 60 colonies on a cultured plate. For the purposes of computations, a 1ml sample with >60 colonies equates to 6000 colonies/100ml; a 2ml sample with >60 colonies equates to 3000 colonies/100ml; a 3ml sample with >60 colonies equates to 2000 colonies/100ml; a 4ml sample with >60 colonies equates to 1500 colonies/100ml; a 5ml sample with >60 colonies equates to 1200 colonies/100ml per direction from VA DEQ.

### *Average E. coli concentrations per site between July 2011 and June 2012*

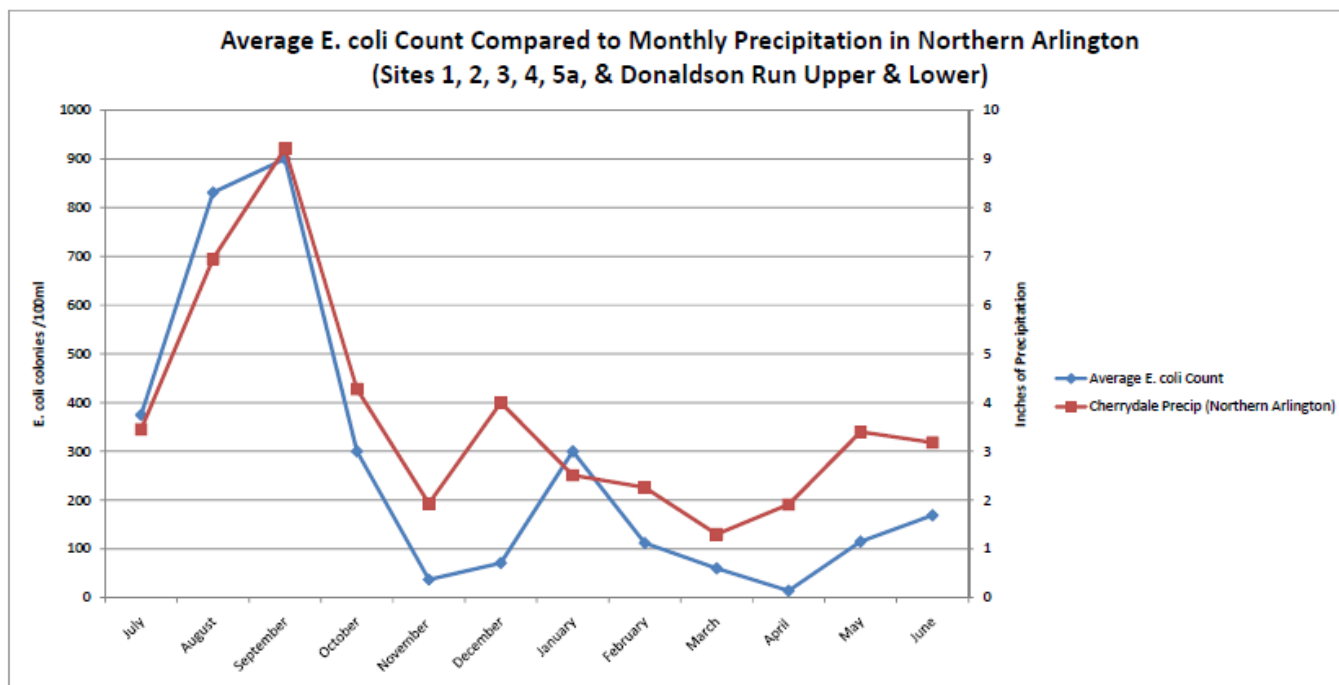
A follow-up investigation was conducted at site 6, where bacterial levels seemed to be unusually low, coupled with a depressed macroinvertebrate community and a lack of algae on the stream rocks. A coordinated investigation with the DES WSS uncovered a broken water main, which has been repaired. Recommendations have also been made, based on the volunteer E. coli data, for sections of the sanitary sewer system to be relined.

A new volunteer has monitored site 8 during this past year and the bacterial levels have only had one occurrence of exceeding the primary standard and no exceedances of the secondary standard. This reinforces our conclusion that monitor error likely generated the elevated E. coli counts in the previous years.

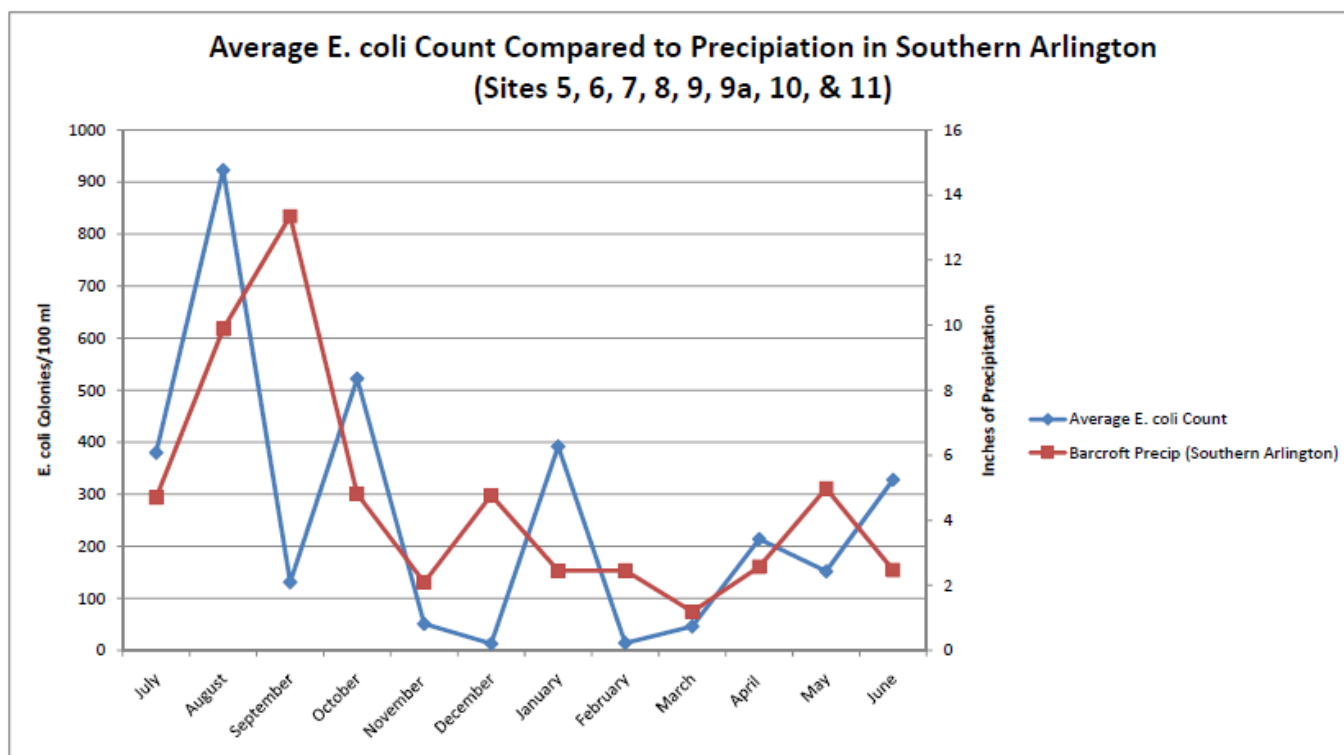
Refresher training was provided for Arlington's volunteer monitors on January 10, 2012. Monitors from Falls Church City's George Mason High School also attended and shared their Coliscan Easygel experiences. Virginia DEQ's James Beckley then provided a session on Coliscan Easygel best practices for the monitors. Arlington plans to continue to provide refresher trainings for its bacteria monitor volunteers.

Arlington has also posted its volunteer E. coli bacteria data on a new webpage ([www.arlingtonva.us/departments/EnvironmentalServices/sustainability/page83733.aspx](http://www.arlingtonva.us/departments/EnvironmentalServices/sustainability/page83733.aspx)). This easy-to-access information will help the public make informed recreational decisions regarding Arlington's streams.

In preparation for this report, precipitation levels were gathered from two [www.weatherunderground.com](http://www.weatherunderground.com) rain gauges, one in northern Arlington (Cherrydale) and the other in southern Arlington (Barcroft). The figures below depict the average E. coli levels per month against the precipitation levels for northern and southern Arlington respectively. A reliable connection between rainfall and bacteria levels was not found. There are three possible explanations for the lack of a relationship. First, volunteer monitors collect the E. coli data on a prescribed day, but not at a specific hour of the day. Some monitors may monitor very soon after a rainfall and others may monitor much later in the day. This could impact a rainfall/bacteria relationship data. Secondly, even with dividing the data and rainfall into northern and southern categories, there can still be precipitation differences within these smaller land areas. Finally, two of the sites with the higher E. coli concentration averages, 5 and 10, are both represented in the southern Arlington graph. The high counts from these two sites heavily impact the data due to the small dataset size. When looking at a 12 month data set, one site's high colony count can disproportionately impact the analysis, making it very difficult to find correlations between the data sets.



*Comparison of average E. coli counts and precipitation in northern Arlington*



*Comparison of average E. coli counts and precipitation in south Arlington*

### **Floatables reduction**

In addition to the County's regular refuse collection and recycling programs, the discharge of human-generated solid waste to the storm sewer system and streams is addressed primarily through the street sweeping and catch basin/storm sewer cleaning programs, as well as through outreach and education programs. Also, as described above in Sections C and D, Arlington County is in the early stages of implementing watershed retrofits which will help capture floatables, sediment, petroleum products and other pollutants.

See also Section K for a discussion of the Trash Free Potomac Watershed Initiative.

Consistent with the requirements of Section C.3 of the permit, Arlingtonians for a Clean Environment administered the required floatables monitoring program at three locations along Four Mile Run as part of ACE's year-round stream cleanup programs. The three locations include two sites in lower Four Mile Run at Shirlington Park and at Barcroft Park and one in middle Four Mile Run near Columbia Pike. Results of this program for FY 2012 are provided in Section M.

### **Infiltration and inflow program**

Analysis by County staff has indicated that the most cost effective way to eliminate bypasses at the County's Water Pollution Control facility is through the construction of additional equalization tanks to deal with wet weather flows. It should be noted that there are no chronic capacity issues that cause sanitary sewer overflows (SSOs) on a regular basis; the County's Sanitary Sewer Master Plan outlines projects to deal with anticipated capacity issues in the future.

The I/I program consists of field inspections (including smoke and dye tests) to identify sources of inflow; comprehensive TV inspections are also conducted under this program, along with the rehabilitation and replacement of sewers. Closed circuit TV inspections are used to identify sanitary sewers in need of rehabilitation to prevent infiltration into the system. The County has been inspecting and lining "trouble" spots (locations that require regular flushing to prevent stoppages), and locations with stoppages. These inspections have revealed locations that needed to be lined – those locations can be anywhere in the County. County inspections also include new developer installed public sewers, and inspection is required before the County will accept ownership and maintenance.

To date, approximately 126 miles of the 464-mile system have been re-lined – **27.1 percent of the system.**

| Sewer line inspection and re-lining information |                |              |
|---|----------------|--------------|
| Year  | Feet inspected | Feet relined |
| 1997  | 80,568         | N/A          |
| 1998  | 137,636        | N/A          |
| 1999  | 137,510        | 36,620       |
| 2000  | 130,714        | 45,001       |
| 2001  | 131,290        | 35,376       |
| 2002  | 132,347        | 30,200       |
| 2003  | 109,954        | 30,060       |
| 2004  | 203,847        | 49,425       |
| 2005  | 92,992         | 29,541       |
| 2006  | 89,561         | 40,956       |
| 2007  | 155,726        | 35,592       |
| 2008  | 106,692        | 44,206       |
| 2009  | 97,032         | 68,149       |
| 2010  | 178,861        | 51,523       |
| 2011  | 62,912         | 59,573       |
| 2012  | 86,166         | 50,886       |

### Household hazardous materials program

DES manages the County's household hazardous materials (HHM) program, which provides for the safe collection, transport and disposal of unwanted HHM material in an environmentally appropriate manner as part of a comprehensive strategy that promotes citizen awareness regarding proper handling of HHM; reduces the amount of HHM in the municipal solid waste stream, which ultimately is taken to combustors or landfills; limits the amount of HHM which is dumped down a drain and ultimately discharged to the County's Water Pollution Control Plant, or is dumped indiscriminately; and helps to reduce the risk of injuries to workers, the community, and the environment.

The data for FY 2012 (with a comparison to FY 2011) are shown below.

| HHM Program Production<br>FY10 and FY11 | Fiscal Year         |                     | % Year-to-Year<br>Change<br>+ / (-) |
|---|---------------------|---------------------|-------------------------------------|
|   | <u>FY11</u>         | <u>FY12</u>         |                                     |
| HHM Facility                            | 6,407               | 6,356               | (1%)                                |
| Fall E-CARE                             | 540                 | 1,023               | 89%                                 |
| Spring E-CARE                           | 1,321               | 1,341               | 2%                                  |
| <b>Fiscal Year Total</b>                | <b><u>8,268</u></b> | <b><u>8,720</u></b> | <b>5.5%</b>                         |

*Year-to-Year Resident Participation HHM Program FY11 and FY12\**

\* Numbers reflect those resident participants serviced signing in the HHM Program and E-CARE Participation Registration Logs



| HHM Program Production<br>FY11 and FY12 |  | Fiscal Year           |                       | % Year-to-Year<br>Change<br>+ / (-) |
|---|--|-----------------------|-----------------------|-------------------------------------|
|   |  | FY11                  | FY12                  |                                     |
| HHM Facility                            | HHM Collected (lbs)                    | 270,290               | 275,439               | 2%                                  |
|   | Electronics Collected (lbs)            | 107,814               | 99,024                | (8%)                                |
|   | <b>Total Materials Collected (lbs)</b> | <b><u>378,104</u></b> | <b><u>374,463</u></b> | <b>(1%)</b>                         |
| Fall E-CARE                             | HHM Collected (lbs)                    | 45,128                | 75,890                | 68%                                 |
|   | Electronics Collected (lbs)            | 10,481                | 27,731                | 165%                                |
|   | <b>Total Materials Collected (lbs)</b> | <b><u>55,609</u></b>  | <b><u>103,621</u></b> | <b>86%</b>                          |
| Spring E-CARE                           | HHM Collected (lbs)                    | 92,948                | 79,810                | (14%)                               |
|   | Electronics Collected (lbs)            | 39,371                | 37,845                | (4%)                                |
|   | <b>Total Materials Collected (lbs)</b> | <b><u>132,319</u></b> | <b><u>117,655</u></b> | <b>(11%)</b>                        |
| Total HHM Facility (lbs)                |  | 378,104               | 374,463               | (1%)                                |
| Total E-CAREs (lbs)                     |  | 187,928               | 221,276               | 18%                                 |
| <b>Fiscal Year Total (lbs)</b>          |  | <b><u>566,032</u></b> | <b><u>595,739</u></b> | <b>5%</b>                           |

*Year-to-Year (YTY) Material Collection HHM Program FY11 and FY12 \**

\* Amounts reflect those collected material manifested off-site or documented through bill of lading

### Legal authority

The Utilities Ordinance (Chapter 26), Fire Prevention Code (Chapter 8), Plumbing Code (Chapter 18), and Refuse Code (Chapter 10) provide the authority to prohibit illicit discharges and connections, as well as illegal dumping. In practice, most illicit discharges are transient rather than chronic in nature (e.g., paint dumping) and the primary challenge is catching the offender rather than eliminating the discharge. Chronic illicit discharges such as sanitary sewer cross connections are required to be removed as soon as possible.

Arlington County's existing enforcement capability is sufficient to respond to the most acute discharges, including hazardous materials, construction site sediment, or sanitary sewage releases. Increased staffing has improved the County's capacity to respond to and investigate other episodic discharges (e.g., paint, wash water, or concrete dumping), to conduct actual enforcement actions for any discharge incident where warranted, and to conduct pollution prevention/outreach activities.

OSEM sends educational letters and/or notices of violation to responsible parties following investigations where discharges are observed or there is the potential for unauthorized discharges to occur.

In June 2010, the County amended the County Code, Chapter 26-5 and 26-9, to establish a more defined enforcement mechanism and schedule of civil penalties for violations of this section of the code. Civil penalties can be assessed against persons that discharge directly or indirectly into the storm sewer system or state waters, any substance likely, in the opinion of the County Manager, to have an adverse effect on the storm sewer system or state waters. A discharge may be considered moderate or serious. A serious discharge is one that is determined to be an immediate threat to the environment, public health, or safety to the County's storm sewer system or state waters. Penalties range from \$100 to \$500 for moderate violations and from \$500 to \$2,500 for serious violations, both depending upon the number of offenses. The maximum civil penalty is \$32,500 for each violation within the discretion of the Court. Each day of violation shall constitute a separate offense. County staff may issue a civil penalty to individuals that violate the code, repeat offenders, or individuals who fail take corrective action within a specified time frame. Civil penalties shall be paid to the Treasurer of Arlington County and used for the purpose of minimizing, preventing, managing, or mitigating pollution of the surface waters.

OSEM continues to work with the Fire Marshal's Office on investigations and having summons issued when discharges involve the release of hazardous materials to the storm sewer system and surface waters. OSEM also works with the County Health Department on housekeeping and illicit discharge issues related to restaurants or commercial pools.

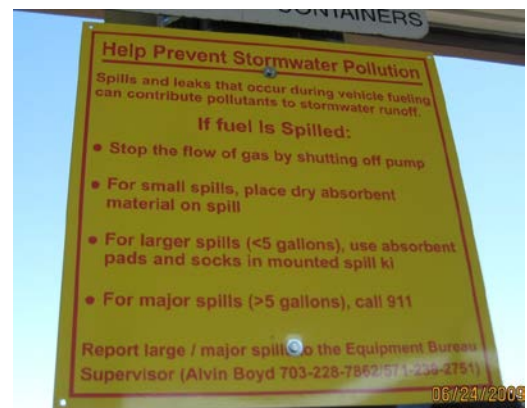
## **G. Spill Prevention and Response**

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The Arlington County Fire Department Hazardous Materials Team and Fire Marshal Office respond to pollution incidents. DES staff assists with investigation and cleanup oversight as needed. DES staff also work with specific business sectors on pollution prevention efforts to prevent unauthorized discharges and cleanup measures following spills that enter, or have the potential to enter, the storm sewer.

County staff have taken measures to prevent and mitigate spills at County facilities. Spills kits have been placed at all eight facilities at the Arlington County Trades Center. Additionally, efforts are being taken to ensure spill kits are in fleet vehicles to allow prompt cleanup of any small spills that occur during field operations. A number of large secondary containment units have been purchased and are being used for outdoor storage of tanks and drums.

In FY 2009 the County completed a comprehensive stormwater pollution prevention plan (SWPPP) for the Arlington County Trades Center. The SWPPP focuses on the operations of eight different facilities at the Trades Center, identifies potential sources of stormwater pollution, and recommends appropriate structural and nonstructural best management practices to prevent or minimize the discharge of pollutants in stormwater runoff from the site. Environmental SOPs for field operations are also included in the SWPPP to help prevent and minimize non-stormwater discharges during field



operations. The SWPPP is in the process of being updated to incorporate additional practices and controls that have been implemented since the plan was developed.



In FY 2012, over 450 County employees received training on stormwater pollution prevention and spill prevention and control. Quarterly facility inspections are conducted as part of the SWPPP implementation.

The Trades Center Integrated Spill Prevention, Control, and Countermeasures / Hazardous Material Management Plan was updated in July 2009. The integrated plan focuses on spill prevention and response as well as provides an inventory of hazardous wastes used and stored at the facility. The plan satisfies the provisions of 40 CFR, Part 112, as well as the Hazardous Materials Management Plan requirements of Chapter 8 of the Arlington County Code. Employees are required to take on-line classes covering stormwater, environmental regulations, and RCRA inspections of storage tanks are conducted on a quarterly basis as specified in the plan.

All Fire Department staff receive training on hazardous material awareness and spill response. Hazardous Materials Technicians and Specialists are required to do refresher training for their certification. The Technicians provide training and instruction on spill response to the County SWAT Team. Police staff are also required to take an online course about hazardous materials and spill response. Police personnel also carry some spill response equipment in their vehicles.

In FY 2013, additional environmental compliance and safety training will be conducted to help educate County supervisors.

## H. Industrial and High Risk Runoff

| Summary of program   |                     |
|--|---------------------|
| Program element  | Responsible party   |
| Use of State VPDES permitting authority to determine significant pollutant sources | DES/OSEM            |
| Existing industrial facilities limited and already permitted through VPDES program | DES/OSEM            |
| Focus on pollution prevention for specific business sectors                        | DES/OSEM; ACFD      |
| Spill and hazmat management plan for Trades Center                                 | DES/OSEM and DES/OD |
| Stormwater pollution prevention plan for Trades Center                             | DES/OSEM and DES/OD |

Arlington County defers to the State as the primary VPDES permitting authority to make the determination as to whether any facility should be permitted for either stormwater or wastewater discharges. And, Section B.1.h of the County's existing permit provides Arlington with the option, in order to determine 'substantial pollutant loading,' of referring the facility to DEQ to obtain a permit. If DEQ determines a permit is not required, that serves as Arlington County's determination that the facility is not contributing a 'substantial' pollutant loading of either stormwater or wastewater.

This is reinforced by Section A.1.3 of the permit and the requirement that any non-stormwater discharge not listed as allowable in this section be authorized by a separate VPDES Permit.

OSEM maintains a spreadsheet of all VPDES permitted facilities in Arlington County. On a quarterly basis, OSEM contacts VA DEQ via email to verify the information is accurate and up to date. Staff has requested to be notified by DEQ when new permits are issued. OSEM staff track site investigations conducted by DEQ where a determination is made that an Individual or General Permit is required for a facility to ensure a permit is submitted.

Existing facilities in Arlington County that are regulated by the VPDES program (as of July 2012) include:

### VPDES Individual Permits

VA0025143 Arlington County Water Pollution Control Facility  
VA0032000 US Department of Defense - Pentagon  
VA0089796 The Nature Conservancy

### Car Wash General Permits

VAG750155 Universal Air and Vacuum Service  
VAG750156 BP Amoco 84667  
VAG750173 BMW of Arlington

VAG750191 C&G Imports (North Fairfax Drive)  
VAG750192 C&G Imports (Wilson Boulevard)  
VAG750208 Avis Rental Car  
VAG750207 Enterprise Shirlington  
Pending Best Sales Auto (Permit needed but no response to DEQ)  
Pending Car World

### **Ready-Mix Concrete General Permits**

VAG110087 Virginia Concrete Company Inc. – Shirlington  
VAG110319 Lafarge Mid-Atlantic LLC

### **Storm Water Industrial General Permits**

VAR050997 Red Top Cab - Transportation Incorporated  
VAR051097 WMATA - Four Mile Run Bus Garage  
VAR051296 US Army - Joint Base Myer Henderson Hall  
VAR051421 Arlington County Water Pollution Control Facility  
VAR051790 US NPS - George Washington Memorial Pkwy Maint

### **Petroleum General Permits**

VAG830101 Ballston Common Associates LP  
VAG830321 Halstead at Arlington  
VAG830337 Shell 139445 - Columbia Pike  
VAG830340 1812 Holdings LLC Property - 1812 North Moore St  
VAG830356 Founders Square  
VAG830393 1716 Wilson Limited Liability Corporation Property  
VAG830419 Founders Square  
VAG830428 Monument View II  
VAG830433 Lodestar Inc., 1900 Wilson Blvd  
VAG830436 Three Metropolitan Park

### **Nutrient General Permit**

VAN010021 Arlington County Water Pollution Control Plant

### **No Exposure**

BAE Systems

New industrial facilities are unlikely due to current Zoning but will be identified during the building permit process.

In addition, the Arlington County's Trades Center, although unregulated by the industrial VPDES program, has been targeted for stormwater pollution reduction, as follows:

- Five Stormfilter<sup>®</sup> and three Stormceptor<sup>®</sup> water quality BMPs treat runoff from certain areas throughout the Trades Center (approximately 7.53 acres of impervious surface).
- A comprehensive stormwater pollution prevention plan was completed in FY2009, and stormwater pollution prevention posters have been placed in each facility.

- Storm drain markers have been affixed to storm drains throughout the Trades Center to raise awareness that the area drains to Four Mile Run.
- In 2009 the old salt dome was replaced with a new salt storage facility. The new larger facility holds more materials reducing the number of deliveries, and allows loading and unloading to occur completely undercover, which minimizes outside spills and tracking from the facility.
- Eighty-five Ultra Urban filter inserts were installed in seventeen storm drains (draining approximately 5.4 acres) on the east side of the Trades Center.

Most of the other 'high risk' facilities in Arlington County are auto-related businesses and are currently unregulated by the industrial VPDES program. The Fire Marshal's Office is responsible for conducting inspections of auto facilities, gas stations, dry cleaning establishments, and other miscellaneous businesses.

- Fire Marshal's Office issues permits for more than 100 major auto facilities (including repair shops, body shops, detailers, tire-repair shops, service stations, etc.).
- Fire Marshal inspects for proper storage, permitting, and documentation for hazardous materials and wastes and ensures measures and practices are in place to prevent releases of hazardous materials to storm sewer or stream.
- Notices of violation are issued to facilities that are not in compliance.
- Any observed illicit discharges to the MS4 or surface waters are reported to OSEM.

As described in Section F, the County is implementing efforts to ensure that all vehicle washing and commercial swimming pool operations in the County operate in compliance with the County's MS4 permit and state VPDES regulations. In addition, construction site dewatering operations are a source of non-stormwater discharges in Arlington County with the potential to represent a significant source of pollutants to State waters. The County has been requesting that developers conduct groundwater sampling prior to discharging to the storm sewer to ensure no contaminants are being discharged. The County has been active in notifying construction site operators of the requirements for such discharges, including ensuring when necessary that discharges from petroleum contaminated sites are regulated by the VPDES General Permit in accordance with 9 VAC 25-120-10 et seq.

## **I. Construction Site Runoff**

| <b>Summary of program</b>   |                          |
|---|--------------------------|
| <b>Program element</b>  | <b>Responsible party</b> |
| Review of all land disturbing activities with >2,500 square feet of disturbance | DES/DOT/DG               |
| Inspections and enforcement   | DES/DOT/DG               |

Since July 1, 2005, the Development Services unit of DES/DOT has administered the Erosion and Sediment Control Program for Arlington County. Currently, there are seven inspectors and one inspection program manager and three plan reviewers (including a certified program administrator) managing the program.



The Erosion and Sediment Control Ordinance (Chapter 57 of the County Code) requires an erosion and sediment control plan for clearing and grading activities with greater than 2,500 square feet of land disturbance. The ordinance also includes a civil penalties ticketing provision to streamline enforcement capabilities. This provision is in the process of being implemented.

With the revisions to the State Stormwater Management Regulations in 2005 and the lowering of the land disturbance threshold requiring the construction general permit to 2,500 square feet in MS4 as well as Tidewater jurisdictions, all building permit applicants with land disturbance that exceeds this threshold are notified of their responsibility to obtain this permit (a copy of the notification form was attached as Appendix F to the 2007 permit renewal application).

During FY 2012, there were 156 active construction projects having 2,500 square feet of land disturbance or greater. There were 24 notices to comply and 10 stop work orders issued as a result of erosion and sediment control violations in FY 2012.

See Section B for data on approved land disturbing projects and total disturbed acreage.

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## **J. Storm sewer infrastructure management**

In FY 2009, two positions were filled to update the inventory of storm sewer infrastructure in the County. These positions are focusing on capturing new infrastructure as it is built as well as gathering data for infrastructure built since 1993, when the inventory was last updated. This work is expected to take several years, with extensive plan review and field verification efforts. As data is captured, the County stormwater GIS data layer is updated. Since this effort began, approximately 30 miles of storm sewer has been added to the inventory.

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## **K. Public Education**

Arlington County conducts education and outreach activities for a comprehensive variety of stormwater and watershed management issues, including nonpoint source pollution, illicit discharges and pollution prevention, household hazardous waste, litter, and recycling, stream buffer and stream restoration, and water quality monitoring. Some activities are conducted annually and others vary from year to year—all are described in detail in each annual report. These programs range from volunteer stream cleanup events, storm drain marking, and school and civic group presentations to Web-based information and multi-media outreach efforts (including posters in Metro stations and the Northern Virginia regional radio campaign).

Stormwater and watershed-related public education activities are conducted primarily by DES and DPR staff, with collaborative efforts with other northern Virginia jurisdictions, Arlingtonians for a Clean Environment, Northern Virginia Regional Commission, Northern Virginia Soil and Water Conservation District, and other organizations. The following sections provide summaries of the key programs for FY2012.

### **Watershed Education**

#### *Regional Stormwater Education Campaign*

In 2012 Arlington County continued to support the [Northern Virginia Clean Water Partners](#), which enables Northern Virginia jurisdictions to pool outreach funds to conduct a regional stormwater education campaign. In recent years, the campaign has expanded to include online advertising through social networking sites and search engines, in addition to radio advertising. While the use of radio advertising has been effective in the early years of the campaign, the audience for traditional media outlets has decreased in recent years.

In April 2012, two radio ads featuring messages on the importance of picking up pet waste and general household stormwater pollution reduction measures aired on three popular radio stations, including one Spanish speaking station, a total of 236 times. These ads reached approximately 54,563 Northern Virginia residents and resulted in over 200 visits to the [www.onlyrain.org](http://www.onlyrain.org) website.

Since July of 2011, campaign ads have appeared on Google, Facebook, and YouTube advertisements appeared over 8 million times, resulting in over 60,000 visits to the campaign web sites.

For the FY12 campaign, the campaign Partners continued to highlight the issue of pet waste with the [Northern Virginia Dog Blog](#). The Dog Blog features articles about dogs and contains a message about picking up pet waste woven into the articles a specific number of times per month. With support from advertisements, contests, and great writing and reader engagement, the Northern Virginia Dog Blog reaches 1,835 subscribers. An essay contest was also run on the Blog, receiving 11 entries and resulting in 10,360 voted for the different essays, all of which included a message about the importance of picking up after your dog. Many comments have been received on the Dog Blog site and 300 site visitors completed a poll question on the Blog. (<http://www.northern-virginia-dog-blog.com/>).

The Clean Water Partners also support a related Blog, the [Metro DC Lawn and Garden Blog](#), (<http://gardening.mwcog.org/>) which features messaging about reducing pollution and runoff through green gardening activities. For FY12, the Lawn and Garden Blog reached 2712 subscribers, and hosted a Green Garden photo contest with 19 photo entries and 929 votes for the photographs.

An online ad campaign was run in the spring of 2012 on the topic of reducing fertilizer use. The campaign messages alternatives to spring fertilizing, such as Fertilize in the Fall, Mow High, and Mulch Lawn Clippings. The featured banners ads are below. These banner ads received over 3 million impressions, and resulted in 1,170 clicks to a web page featuring green lawn care information.

# Fertilize in the Fall for a Healthy Lawn and Community

Get more green lawn TIPS here:  
[gardening.mwcog.org](http://gardening.mwcog.org)



## Mow High for a Healthy Lawn and Community

Get more green lawn TIPS here:  
[gardening.mwcog.org](http://gardening.mwcog.org)



## Mulch Clippings for a Healthy Lawn and Community

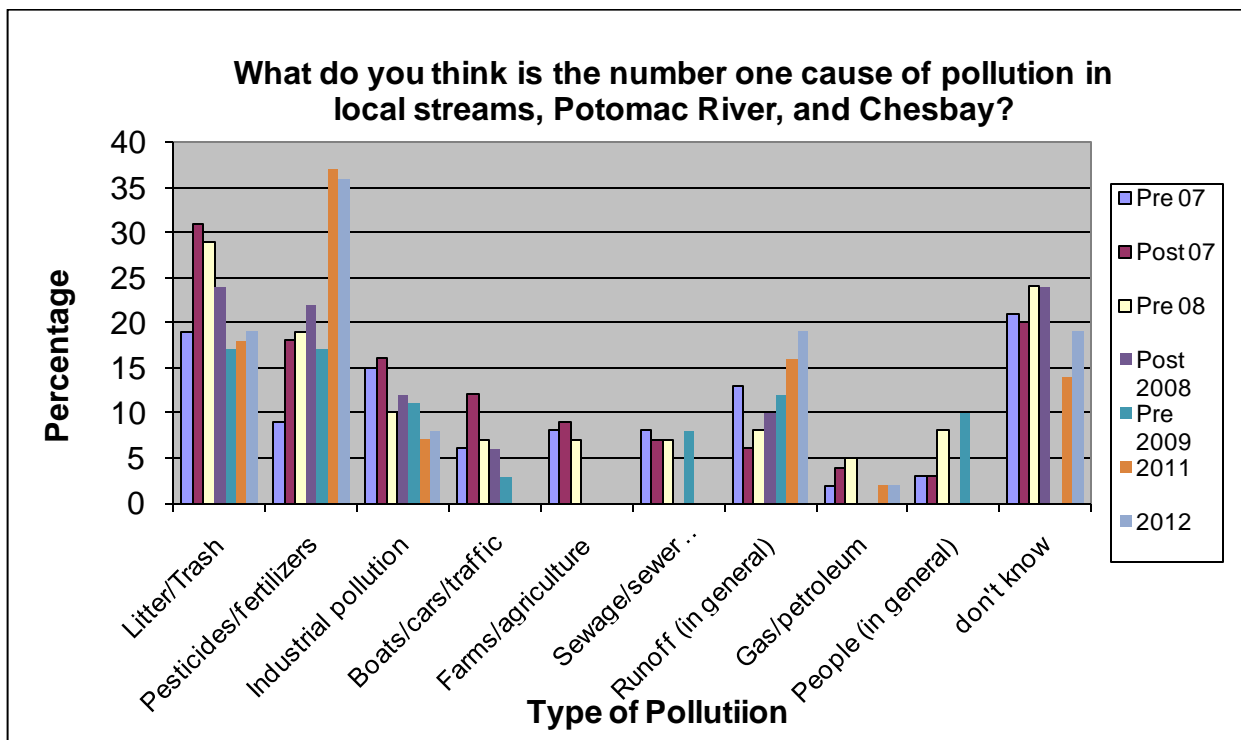
Get more green lawn TIPS here:  
[gardening.mwcog.org](http://gardening.mwcog.org)



During the summer of 2012, a survey was conducted of 500 northern Virginia residents to measure the effectiveness of the campaign. One-fourth of the respondents recalled hearing or seeing advertisements on the internet or on the radio, as compared with one-third in FY11. Of those respondents who recalled the ads, six percent state they now pick up their pet waste more often, 15 percent state that they are more careful with fertilizer, and 7% fertilize fewer times per year.

Other interesting findings in the 2012 survey include:

- Respondents selected **fertilizers and pesticides** and **runoff** as the main causes of pollution in the Potomac River and Chesapeake Bay for the second year in a row.
- The number of respondents choosing **litter or industrial pollution** as the number one source of pollution decreased as compared with previous surveys.
- More than **57% of Arlingtonians knew they live in Potomac River watershed**, higher than any of the other local jurisdictions surveyed, and up from 45% in 2011.
- Interestingly, almost **77% of people surveyed reported that they always pick up after their pet**, as compared with 30% in previous surveys.
- Over 90% of residents surveyed stated that **stormwater goes into the Potomac River or the Chesapeake Bay**, or to local streams and rivers. Of all the jurisdictions surveyed, Arlingtonians and Fairfax residents were most aware that stormwater goes to the Potomac River and Chesapeake Bay.



Over the last five years, survey results show that the majority of Northern Virginia residents are supportive of local governments' spending on protecting water quality. Consistently in all surveys, residents indicate that the role of individuals is important in protecting water quality. Most residents indicate that they take their vehicles to a service station to change their oil or they recycle their used motor oil. Similarly, most Northern Virginia residents pick up after their pets because they see it as the right thing to do. For both of these activities, water quality concerns do not appear to be the motivating factor for residents. The reasons for doing the correct behaviors revolve around convenience and being good neighbors.

The fact that respondents selected fertilizer and pesticides as the number one cause of water pollution is revealing, since over a third of the survey respondents stated that they fertilize their property two or more times per year. It appears there is still a gap between what people perceive as a source of pollution, and the actions they are willing to take on their own property. In the 2012 survey, there was a slight decrease in the number of people fertilizing in the spring, and a slight increase in fall fertilizing. Perhaps efforts to make good lawn care practices more convenient, coupled with the idea that Bayfriendly lawns are what good neighbors do, will continue this trend.

The total cost of the 2012 campaign is \$104,000. The campaign is funded and sponsored by 11 local governments and three independent sanitary and drinking water authorities, Doody Calls, the Northern Virginia Regional Commission, and the Virginia Coastal Zone Management Program. Doody Calls joined as the Northern Virginia Clean Water Partners first business

representative, donating \$1,000 worth of service and contributing in-kind to the effort. Responses to the survey suggest that public support remains strong for local government programs that improve the quality of water in local and regional streams and rivers and the Chesapeake Bay.

### *Presentations and Workshops*

DES staff conducted educational presentations for schools, community groups, and at workshop events. Staff has continued to organize the "Green It Arlington!" series of workshops, covering such topics as rain gardens, green home renovations, green roofs, and energy conservation. These workshops are attended by approximately 1,000 people every year. During the past year, staff presented information about water quality for nine school groups, 32 community groups, and at four community events. The County's enviroscape was used to educate six school groups about watersheds. Staff gave presentations for an EPA Webinar and at a Sustainable Landscaping Seminar. These presentations reached over 3,867 residents, students and colleagues. Staff also participated in the annual County Fair, which receives more than 60,000 visitors. Staff also conducts educational training for the Master Gardeners and Arlington Regional Master Naturalists.



*Wayne the Water Drop is featured at the Environmental Services County Fair booth to educate residents and protecting and conserving water.*

### *Regional Rain Barrel Program*

Arlington County staff helped expand the Northern Virginia Regional rain barrel program over the past year, including helping staff two rain barrel workshops. Through this program, 3000 rain barrels were sold, with more than 800 of those rain barrels going to Arlington residents, with a 90% satisfaction rate for workshop participants. This equates to 125,000 gallons of stormwater that is collected and retained during every storm event.

Surveys are conducted every 2 years to assess the effectiveness of the rain barrel program. The survey of workshop attendees in 2010 showed that many participants took additional actions to reduce stormwater runoff from their homes. Survey results showed that 85% of respondents had installed their barrels. 64% of respondents purchased one rain barrel, and



27% purchased two rain barrels. The primary motivation for installing a rain barrel was water conservation (85%), followed by having water during dry periods (32%) and reducing runoff (27%). 93% of respondents stated they are satisfied with their rain barrel. In addition, many workshop participants have taken other actions to reduce stormwater runoff, such as installing rain gardens (6%), re-directing downspouts (30%), reducing paved areas or adding permeable pavement (7%), or reduced lawn area (30%).

### *Rain Garden Workshops*

Arlington County partners with the Northern Virginia Soil and Water Conservation District and the Northern Virginia Regional Commission to conduct Rain Garden for Homeowners workshops twice each year.

The rain garden workshops are generally well attended, attracting 30-40 residents for each session. A follow up survey of workshop attendees showed that 24% of the attendees installed a rain garden after attending the workshop, and 53% stated that they are still planning to install a rain garden. 75% of respondents had taken another action at home besides installing a rain garden. Most popular actions to take were re-directing downspouts, installing a rain barrel, reducing lawn area, or using native plants.

### *StormwaterWise Landscapes Program*

In 2012, Arlington County created a pilot incentive program for private property owners to improve stormwater management on their property. The [StormwaterWise Landscapes](#) program provides incentives for private property owners to install rain gardens, cisterns, permeable pavement, infiltration trenches, conservation landscaping, and green roofs. Program participants receive a property assessment and written report with recommendations for practices that are appropriate for their property, and they can select practices to install.



*Two projects that were completed as part of the StormwaterWise Landscapes program, a permeable driveway and a permeable walkway.*

### *Educational Materials for Businesses*



DES staff developed educational materials for several specific types of businesses in Arlington County, such as auto repair shops, restaurants, paint stores, and commercial pools. The restaurant poster was mailed to more than 900 restaurants, grocery stores, and other food service establishments in Arlington. The auto care facility poster was mailed to 200 car dealerships, auto shops and gas stations in Arlington. A new “Fats, Oil and Grease” poster is being developed for Arlington restaurants and will be distributed by the end of 2012.

In 2009, staff completed Stormwater pollution prevention folder for businesses with ten inserts on topics such as painting, power washing, parking area management, dumpster management, and fats, oil and grease management. This folder has been distributed to approximately 400 property managers, residential buildings, businesses, and restaurants at this time. See Section F for more information.

### *Trash Free Potomac Watershed Education Campaign*

In 2005, the Alice Ferguson Foundation spearheaded the Trash Free Potomac Watershed Initiative (TFPWI), which commits to a trash-free Potomac by 2013. This initiative engages government agencies, communities, private organizations, and corporations through the Annual Potomac River Watershed Cleanup, the Potomac Watershed Trash Summit, and the Potomac Watershed Trash Treaty. The Foundation believes a trash-free Potomac can become a reality with education, local governmental support, and community-based action.

As part of the TFPWI, organizers have developed a regional public education and awareness program for residents, businesses, and community organizations. Arlington County provided financial support to this effort in 2008 and serves on the steering committee for the initiative. Arlington has used the educational materials in FY2011 in all County schools, community centers, on the County Arlington Transit bus system, on the County web site, and in County park kiosks. An example of the educational graphics created for this campaign is shown below.



### *Stream Volunteer Activities*

Arlington County and ACE offer many stream volunteer opportunities for citizens. A total of 93 volunteers contributed 667 hours of time to the County's stream volunteer activities over the past year. In addition, about thirty new volunteers were recruited and trained to join the programs. Staff ran five stream monitor training classes for new stream monitors. With the additional volunteers, new monitoring sites were added for the benthic macroinvertebrate monitoring program and for the E. coli monitoring program.

Starting in October 2005, volunteers began monitoring E. coli bacteria levels at ten locations in Four Mile Run. Samples are collected monthly and analyzed using the Coliscan EasyGel method. The program, which is sponsored by Virginia DEQ, is intended to identify bacterial hotspots for further investigation. See Section M for more information.

The storm drain marking program continued in FY11, with the marking of approximately 7,500 storm drains in total since the program began (75 percent of the approximately 10,000 catch basins in the County), and the distribution of 2,000 educational door hangers in English and Spanish. This program reminds people that dumping in storm drains is illegal, gives the name of their local watershed, and provides web site and phone number contacts for more information.

In 2012, Arlingtonians for a Clean Environment organized 15 stream and roadside cleanups, collecting 327 bags of trash from Arlington's streams, roadways and the Potomac River. Close to 400 volunteers were involved in these projects.

## **L. Watershed Management Program**

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All of the programs that constitute the County's overall Watershed Management Program are described in detail in this report.

## **M. Monitoring Programs**

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| Summary of program          |                                       |
|-----------------------------|---------------------------------------|
| Program element             | Responsible party                     |
| Storm sewer TV inspection   | DES/OD/WSS                            |
| Bacteria sampling           | DES/OSEM                              |
| Biological monitoring       | DES/OSEM                              |
| Watershed monitoring        | DES/OSEM                              |
| Geomorphological monitoring | DES/OSEM                              |
| Floatables monitoring       | Arlingtonians for a Clean Environment |

### **Dry weather screening**

See Section F for description of dry weather screening programs.

**Wet weather screening program**

During its first permit term, the County monitored stormwater runoff from the storm sewer outfall that discharges runoff from the Arlington County Trades Center. Compared with the other three outfalls monitored during this period (draining low and medium density residential areas and a commercial area), levels of petroleum-related compounds as well as metals were elevated. Implementation of the recently developed spill and hazardous materials management plan at this facility, along with the water quality BMP retrofits already in place and in-planning for the future for this facility, should result in substantially reduced pollutant loads. In addition, implementation of the Trades Center SPCCP and SWPPP described in Section H will provide additional pollution reductions.

**Industrial and high risk facility runoff monitoring program**

See Section H.

**Watershed monitoring program**

As required by Section C.1. of Arlington County's permit, the County submitted its Watershed Monitoring Program plan to Virginia DEQ in August 2003. Implementation of this plan began in FY 2004, as required by the permit, with the installation of the Four Mile Run monitoring station in Bluemont Park.

Staff completed installation of the Donaldson Run monitoring station in August 2005 following the long delayed completion of a major construction project that began in 2003 to replace a culvert under Military Road with a bridge.

The major storm event that occurred on June 25 and 26, 2006, damaged the flow meter and pH probe at the Four Mile Run monitoring station. Four Mile Run overflowed its banks at this location and carried the sampler housing unit several hundred yards downstream. During FY 2007, a new pH probe was installed, the flow meter repaired by the manufacturer, and the station re-established. Additional repair and replacements of equipment has been done as a result of rodents, hymenopteran and arachnid activity, vandalism, weed whacking, severe weather, and equipment failure.

Wet weather monitoring continued to be conducted at the Four Mile Run Bluemont site and Donaldson Run site in FY 2012. Detailed information about the wet weather monitoring program at these stations is provided in the Watershed Monitoring Program plan submitted to Virginia DEQ in August 2003.

Wet weather monitoring data from FY 2005 – 2012 are provided in the table below.

| Date           | Total Flow (MG) | Total rainfall (in) | pH          | Fecal strep #/100 mL | Fecal coliform #/100 mL | TSS mg/L      | TDS mg/L      | BOD mg/L     | COD mg/L      | phosphorus mg/L | Nitrate+ Nitrite mg/L | TKN mg/L    | ammonia mg/L | TN mg/L     |
|----------------|-----------------|---------------------|-------------|----------------------|-------------------------|---------------|---------------|--------------|---------------|-----------------|-----------------------|-------------|--------------|-------------|
| 06/17/04       | 1.57            | 0.67                |             | 240000               | 110000                  | 490           | 60            | 11           | 40            | 0.95            | 0.54                  | 3.7         | 0.2          | 4.24        |
| 07/14/04       | 0.40            | 0.12                | 6.70        | 4300                 | 930                     | 370           | 210           | 31           | 62            | 0.5             | 1.8                   | 4.7         | 0.8          | 6.5         |
| 03/28/05       | 1.90            | 0.64                | 7.20        | 11000                | 2400                    | 160           | 79            | 3            | 80            | 0.22            | 0.51                  | 1.3         | 0.4          | 1.81        |
| 04/08/05       | 0.52            | 0.23                | 7.30        | 15000                | 750                     | 34            | 160           | 6            | 64            | 0.3             | 0.94                  | 5.7         | <0.2         | 6.64        |
| 10/07/05       | 4.9             | 0.71                | 7.2         | 24000                | 24000                   | 9             | 37            | 58           | 320           | 0.89            | 0.57                  | 1.3         | 1.1          | 1.87        |
| 05/11/06       | NA*             | 0.96                | NA*         | 240000               | 15000                   | 250           | 61            | 40           | 330           | 1.6             | 0.79                  | 9.1         | 0.5          | 9.89        |
| 11/16/06       | 6.4             | 1.85                | NA*         | 53000                | 380000                  | 33            | 167           | 14           | 87            | 0.42            | 0.42                  | 2.1         | 0.11         | 2.52        |
| 04/12/07       | NA**            | 0.64                | NA*         | >60                  | NA                      | 129           | 196           | 5.4          | 83            | 0.44            | 1.46                  | 2.4         | 0.39         | 3.86        |
| 05/16/07       | NA**            | 0.14                | NA*         | 6490                 | 9910                    | 53            | 294           | 9.8          | 508           | 0.81            | 1.68                  | 4           | 0.94         | 5.68        |
| 02/13/08       | NA**            | 0.11                | NA*         | 2970                 | 1530                    | 16            | 342           | 3.8          | 52            | 0.29            | 0.82                  | 2.3         | <0.2         | 3.12        |
| 03/04/08       | NA**            | 1.34                | NA*         | 28000                | 340000                  | 287           | 211           | 10.3         | 150           | 1.79            | 0.49                  | 6.7         | 0.22         | 7.19        |
| 05/05/09       | 4.9             | 0.36                | NA*         | 1600                 | 1600                    | 33            | 150           | <5           | 78            | 0.5             | <0.02                 | 2.7         | <0.2         | 2.8         |
| 05/26/09       | NA*             | 0.92                | NA*         | NA                   | NA                      | 16            | 100           | <5           | 23            | 0.5             | 0.96                  | 0.8         | 0.2          | 1.76        |
| 06/17/09       | NA*             | 0.10                | NA*         | 1600                 | 1600                    | 99            | 180           | 12           | 60            | 0.67            | 0.76                  | 3.2         | 0.6          | 3.96        |
| 03/22/10       | 8.70            | 0.39                | 7.10        | 1600                 | 1600                    | 86            | 150           | 5            | 140           | 0.51            | 0.77                  | 3           | 0.6          | 3.77        |
| 04/08/10       | 14.50           | 0.77                | 7.20        | 1600                 | 1600                    | 560           | 280           | 180          | 350           | 1.7             | 1                     | 8.5         | 1.3          | 9.5         |
| 04/21/10       | 7.60            | 0.18                | 7.10        | 8000                 | 7000                    | 96            | 250           | <50          | 120           | 0.68            | 0.92                  | 3.6         | 0.6          | 4.52        |
| 05/03/10       | 17.10           | 0.33                | 7.10        | 80000                | 1600000                 | 650           | 120           | 64           | 290           | 1.2             | 0.48                  | 4.5         | 0.7          | 4.98        |
| 12/01/10       | 9.80            | 0.77                | 6.70        | 16000                | 16000                   | 110           | 100           | 16           | 90            | 0.41            | 0.4                   | 1.7         | 1.1          | 2.1         |
| 03/15/11       | 1.73            | 0.13                | 6.70        | 30000                | 16000                   | 64            | 170           | 41           | 33            | 0.26            | 0.92                  | 1.1         | <0.2         | 2.02        |
| 06/01/11       | 1.36            | 0.18                | 7.20        | 240000               | 4600                    | 320           | 160           | 57           | 350           | 1.1             | 1.1                   | 1.7         | 0.7          | 2.8         |
| 06/16/11       | 16.60           | 0.66                | NA****      | 160000               | 16000                   | 20            | 220           | 6            | 52            | 0.28            | 1.8                   | 1.8         | 0.5          | 3.6         |
| 10/19/11       | 14.60           | 0.56                | 7.00        | 160000               | 7000                    | 81            | 120           | 6            | 26            | 0.31            | 0.75                  | 1.1         | 0.3          | 1.85        |
| 11/29/11       | NA**            | 0.42                | 7.20        | 50000                | >12,100                 | 37            | 140           | 17           | 99            | 0.49            | 0.88                  | 10          | 0.7          | 10.88       |
| 05/29/12       | 9.60            | 0.37                | 7.40        | 101900               | NA                      | 110           | 65            | <10          | 62            | 0.37            | 0.71                  | 1.5         | 0.5          | 2.21        |
| 06/12/12       | 1.58            | 0.22                | 7.50        | 30000                | 7000                    | 8             | 240           | <10          | 30            | 0.32            | 1.57                  | 0.7         | <0.2         | 2.27        |
| <b>EMCs***</b> | <b>6.99</b>     | <b>0.54</b>         | <b>7.10</b> | <b>22235</b>         | <b>7925</b>             | <b>134.83</b> | <b>163.92</b> | <b>28.40</b> | <b>137.65</b> | <b>0.67</b>     | <b>0.92</b>           | <b>3.43</b> | <b>0.59</b>  | <b>4.32</b> |

\*data overwritten prior to download

\*\*bubbler tube damaged

\*\*\*geometric mean for bacteria data

\*\*\*\*pH probe damaged

*Storm event data for Four Mile Run watershed monitoring station*

| Date           | Total Flow (MG) | Total rainfall (in) | pH          | Fecal strep #/100 mL | Fecal coliform #/100 mL | TSS mg/L      | TDS mg/L      | BOD mg/L     | COD mg/L      | phosphorus mg/L | Nitrate+ Nitrite mg/L | TKN mg/L    | ammonia mg/L | TN mg/L     |
|----------------|-----------------|---------------------|-------------|----------------------|-------------------------|---------------|---------------|--------------|---------------|-----------------|-----------------------|-------------|--------------|-------------|
| 08/19/05       | 3.80            | 0.11                | 6.95        | 15000                | 4300                    | 31            | 200           | 4            | 41            | 0.20            | 1.72                  | 1.10        | 1.00         | 2.82        |
| 10/07/05       | 5.7             | 0.94                | 7.30        | 24000                | 24000                   | 5             | 190           | 27           | 140           | 0.52            | 1.16                  | 3.10        | 0.80         | 4.26        |
| 04/03/06       | 17.3            | 0.38                | 7.30        | 46000                | 110000                  | 220           | 550           | 16           | 180           | NA              | 1.80                  | 4.40        | 1.00         | 6.20        |
| 05/11/06       | 26.3            | 0.70                | 7.1         | 46000                | 24000                   | 230           | 84            | 13           | 130           | 0.84            | 0.57                  | 4.90        | 0.60         | 5.47        |
| 11/16/06       | NA*             | 1.85                | 6.32        | 38000                | 400000                  | 48            | 176           | 30           | 110           | 2.84            | 0.00                  | 0.90        | 0.14         | 0.90        |
| 06/20/07       | NA**            | 0.30                | 6.90        | 184000               | NA                      | 121           | 266           | 55           | 210           | 0.68            | 1.80                  | 5.40        | 1.34         | 7.20        |
| 03/04/08       | NA**            | 1.68                | NA*         | 1200                 | 5600                    | 138           | 693           | 10.7         | 301           | 1.32            | 0.67                  | 6.00        | 0.19         | 6.67        |
| 05/07/09       | 11.27           | 0.36                | 6.50        | 1600                 | 500                     | 130           | 210           | 7.0          | 27            | 0.23            | 1.50                  | 1.80        | 0.60         | 3.30        |
| 05/26/09       | 9.35            | 1.86                | NA*         | NA                   | NA                      | 10            | 140           | <5           | 20            | 0.20            | 1.00                  | 1.60        | 0.40         | 2.60        |
| 06/17/09       | NA*             | 0.10                | 6.53        | 1600                 | 1600                    | 150           | 200           | 6.0          | 80            | 0.11            | 1.40                  | 1.30        | <0.2         | 2.70        |
| 03/22/10       | 3.53            | 0.38                | 7.30        | 1600                 | 500                     | 340           | 260           | 130.0        | 150           | 0.65            | 0.92                  | 3.20        | 0.40         | 4.12        |
| 04/08/10       | 4.70            | 0.70                | 7.10        | 1600                 | 1600                    | 310           | 250           | 140.0        | 300           | 1.30            | 1.10                  | 7.40        | 1.00         | 8.50        |
| 04/21/10       | NA*             | 0.22                | 7.00        | 11000                | 22000                   | 85            | 220           | <50          | 350           | 0.95            | 1.00                  | 4.70        | 1.00         | 5.70        |
| 05/03/10       | 17.50           | 0.43                | 6.96        | 22000                | 1600000                 | 370           | 130           | 30.0         | 230           | 1.30            | 0.56                  | 3.90        | 0.60         | 4.46        |
| 03/15/11       | 1.36            | 0.13                | 7.50        | 2200                 | 300                     | 34            | 200           | 12.0         | 24            | 0.23            | 0.99                  | 1.00        | 0.28         | 1.99        |
| 06/01/11       | 0.71            | 0.12                | 7.10        | 240000               | 24000                   | 290           | 170           | 160.0        | 390           | 0.74            | 0.85                  | 3.00        | 0.50         | 3.85        |
| 06/17/11       | 14.10           | 1.06                | 7.20        | 30000                | 5000                    | 240           | 110           | 19.0         | 120           | 0.90            | 1.20                  | 2.50        | 0.45         | 3.70        |
| 10/19/11       | NA**            | 0.56                | 6.80        | 30000                | 8000                    | 46            | 120           | 8.0          | 33            | 0.38            | 1.10                  | 1.50        | 0.50         | 2.60        |
| 11/29/11       | 1.63            | 0.44                | 6.90        | 90000                | >12100                  | 82            | 97            | <5           | 63            | 0.30            | 0.70                  | 2.10        | 0.30         | 2.80        |
| 05/29/12       | 0.81            | 0.50                | 6.90        | 108100               | NA                      | 43            | 55            | <10          | 81            | 0.53            | 0.77                  | 1.80        | <0.2         | 2.57        |
| 06/12/12       | 1.59            | 0.17                | 6.80        | >160000              | 30000                   | 8             | 190           | <10          | 25            | 0.15            | 1.32                  | 1.10        | 0.20         | 2.42        |
| <b>EMCs***</b> | <b>5.86</b>     | <b>0.61</b>         | <b>6.96</b> | <b>13405</b>         | <b>9570</b>             | <b>139.57</b> | <b>214.81</b> | <b>41.73</b> | <b>143.10</b> | <b>0.72</b>     | <b>1.05</b>           | <b>2.99</b> | <b>0.62</b>  | <b>4.04</b> |

*Storm event data for Donaldson Run watershed monitoring station*

\*data overwritten prior to download

\*\*bubbler tube damaged

\*\*\*geometric mean for bacteria data

Although the data collected to date are limited and both stations were sampled during the same storm even a limited number of times, a comparison between the data for the two stations indicates higher levels of fecal streptococcus bacteria, total suspended solids, and total Kjeldahl nitrogen for the Four Mile Run monitoring station. Looking at averages, the Donaldson Run monitoring station shows higher concentrations of fecal coliform bacteria, total suspended solids, dissolved solids, biological oxygen demand, total phosphorus (although the average is influenced by a single high TP reading), nitrate+nitrite, and ammonia. However, there are not enough data to draw definitive conclusions.

A comparison of the data for these two in-stream stations with overall averages for the data collected at the four outfall monitoring stations during the first permit term indicates that, with the exception of fecal coliform bacteria (similar levels) and dissolved solids (higher levels at outfalls), the sediment, nutrient, and oxygen-demanding pollutant concentrations measured to date at the in-stream stations are higher than the concentrations (and overall loads, as the drainage area for these in-stream stations are significantly larger than that for the outfall stations) of the parameters measured at the outfall stations. This is an interesting preliminary

result and could in part reflect the important role of streambank erosion in delivering both particulate and dissolved pollutants to the water column.

Overall, the watershed monitoring program that began during FY 2004 is too limited in geographic extent and collection frequency for establishing a water quality baseline and evaluating the overall effectiveness of County programs over the long-term for in-stream water quality across the County. And, it is not desirable to focus the County's watershed management efforts in the two subwatersheds where monitoring occurs simply for the purpose of evaluating cause and effect. Further, increasing the scope of this monitoring program to the level of robustness necessary would take critical resources away from the more effective monitoring efforts described in this section and more importantly the planning and implementation of watershed management programs that have actual water quality benefits.

Arlington County strongly believes the role of local governments with limited resources should be focused on planning and implementation of best practices for urban watersheds—with state and federal agencies and universities focusing their efforts on documenting what best practices are, including conducting robust monitoring studies. The bacteria monitoring program referenced in this section, continued biological monitoring, and the geomorphological monitoring program described below represent targeted monitoring efforts that are meaningful and complementary to ongoing programs.

### **Macroinvertebrate monitoring**

On February 28, 2003, Arlington submitted to Virginia DEQ a description of its rapid bioassessment monitoring program to meet the County's permit provisions, Section C.2. Staff believes these data provide the most valuable information about the condition of Arlington's streams because the biological community integrates the effects of physical and chemical inputs to the system. As of June 2012, there are nine active monitoring sites in the County, with data collection during the spring, summer, and fall.

The macroinvertebrate monitoring program is permitted through the Virginia Department of Game and Inland Fisheries (DGIF) and the sampling data are provided on an annual basis to DGIF. Detailed information on monitoring methods and results are provided in the annual data reports for the program, which are provided to DCR during the fall of each year. The data are

| <b>Sampling Station</b>                 | <b>Duration of Sampling</b> |
|---|-----------------------------|
| Donaldson Run                           | 2001- present               |
| Windy Run                               | 2001- present               |
| Gulf Branch                             | 2001- present               |
| Little Pimmit Run                       | 2002 - present              |
| Four Mile Run at Benjamin Banneker Park | 2001- present               |
| Four Mile Run at Bluemont Park          | 2001- present               |
| Lubber Run                              | 2010 - present              |
| Upper Long Branch at Glencarlyn Park    | 2002 - present              |
| Four Mile Run at Barcroft Park          | 2004 – 2005; 2009 - present |
| Reference Site at Webb Nature Sanctuary | 2003 - present              |

*Summary of macroinvertebrate monitoring stations*



also posted on the new Arlington County stream monitoring site, located at ([www.arlingtonva.us/departments/EnvironmentalServices/Sustainability/page82828.aspx](http://www.arlingtonva.us/departments/EnvironmentalServices/Sustainability/page82828.aspx)). Background information, data, and drainage maps are provided for each sampling station at this website.

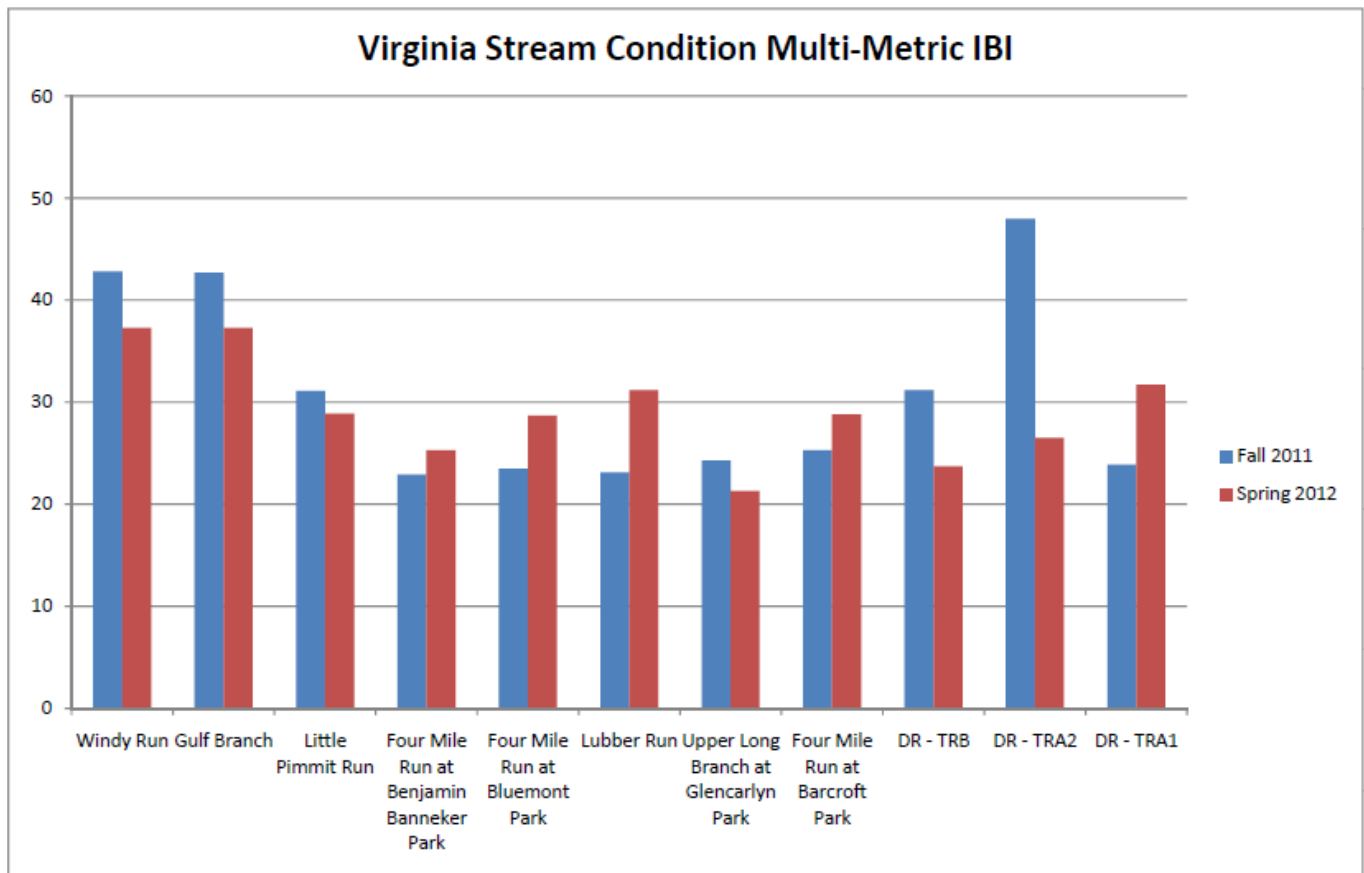
In the fall of 2011, the County hired the Williamsburg Environmental Group (WEG) to provide a professional-quality baseline study of all of the volunteer stations within the County. WEG conducted their field studies during the fall of 2011 and spring of 2012. Fish sampling was included as a part of the fall 2011 field study and a habitat survey was included in the spring 2012 assessment. A summary of WEG's monitoring data is in Table 4. Using the Virginia Stream Condition Multi-Metric IBI Score, WEG determined that three sites in the fall of 2011, Windy Run, Gulf Branch, and Donaldson Run's restored reach, received a designation of "stress." All of the Arlington's other sites in the fall of 2011 and all of the sites in spring 2012 received a rating of "severe stress." In summary, WEG found that Arlington's streams exhibited long-term generalized degradation of ecological conditions and water quality due to urban land use and nonpoint source impacts.

| Sampling Station  | Fall 2011 – VA Stream Condition Multi-Metric IBI Score                         | Spring 2012 – VA Stream Condition Multi-Metric IBI Score                              | Spring 2012 Habitat Assessment Score                                 | Fall 2011 Fish Sampling  |
|---|--|---|--|--|
| Donaldson Run<br>TRA1: Tributary A segment that is below the confluence with Tributary B<br>TRA2: Tributary A - restored<br>TRB: Tributary B - unrestored | TRA1: Severe Stress (23.9)<br>TRA2: Stress (48.0)<br>TRB: Severe Stress (31.2) | TRA1: Severe Stress (31.7)<br>TRA2: Severe Stress (26.5)<br>TRB: Severe Stress (23.7) | TRA1: Optimal (182)<br>TRA2: Optimal (172)<br>TRB: Sub-optimal (130) | American eel: 29<br><i>Anguilla rostrata</i>   |
| Windy Run   | Stress (42.8)  | Severe Stress (37.3)  | Optimal/Sub-optimal (158)  | American eel: 1<br><i>Anguilla rostrata</i>  |
| Gulf Branch   | Stress (42.7)  | Severe Stress (37.3)  | Optimal (172)  | American eel: 18<br><i>Anguilla rostrata</i><br>Blacknose dace: 1<br><i>Rhinichthys atratulus</i>  |
| Little Pimmit Run   | Severe Stress (31.1)   | Severe Stress (28.9)  | Sub-optimal (149)  | American eel: 15<br><i>Anguilla rostrata</i><br>Blacknose dace: 154<br><i>Rhinichthys atratulus</i><br>Longnose dace: 16<br><i>Rhinichthys cataractae</i><br>White sucker: 28<br><i>Catostomus commersoni</i><br>Rosyside dace: 1<br><i>Clinostomus funduloides</i><br>Pumpkinseed: 6<br><i>Lepomis gibbosus</i><br>Green sunfish: 3 |

| Sampling Station                        | Fall 2011 – VA Stream Condition Multi-Metric IBI Score | Spring 2012 – VA Stream Condition Multi-Metric IBI Score | Spring 2012 Habitat Assessment Score | Fall 2011 Fish Sampling  |
|---|--|--|--------------------------------------|--|
|   |  |  |                                      | <i>Lepomis cyanellus</i>   |
| Four Mile Run at Benjamin Banneker Park | Severe Stress (22.9)                                   | Severe Stress (25.3)                                     | Optimal/Sub-optimal (157)            | Blacknose dace: 163<br><i>Rhinichthys atratulus</i>  |
| Four Mile Run at Bluemont Park          | Severe Stress (23.5)                                   | Severe Stress (28.7)                                     | Optimal/Sub-optimal (159)            | American eel: 1<br><i>Anguilla rostrata</i><br>Blacknose dace: 247<br><i>Rhinichthys atratulus</i>   |
| Lubber Run                              | Severe Stress (23.1)                                   | Severe Stress (31.2)                                     | Sub-optimal (150)                    | American eel: 3<br><i>Anguilla rostrata</i><br>Blacknose dace: 114<br><i>Rhinichthys atratulus</i><br>Mummichog: 48<br><i>Fundulus heteroclitus</i>  |
| Upper Long Branch at Glencarlyn Park    | Severe Stress (24.3)                                   | Severe Stress (21.3)                                     | Optimal/Sub-optimal (157)            | American eel: 1<br><i>Anguilla rostrata</i><br>Blacknose dace: 4<br><i>Rhinichthys atratulus</i><br>Mummichog: 1<br><i>Fundulus heteroclitus</i>   |
| Four Mile Run at Barcroft Park          | Severe Stress (25.3)                                   | Severe Stress (28.8)                                     | Optimal/Sub-optimal (156)            | American eel: 5<br><i>Anguilla rostrata</i><br>Blacknose dace: 122<br><i>Rhinichthys atratulus</i><br>White sucker: 73<br><i>Catostomus commersoni</i><br>Pumpkinseed: 24<br><i>Lepomis gibbosus</i><br>Redbreast sunfish: 3<br><i>Lepomis auritus</i><br>Mummichog: 6<br><i>Fundulus heteroclitus</i> |

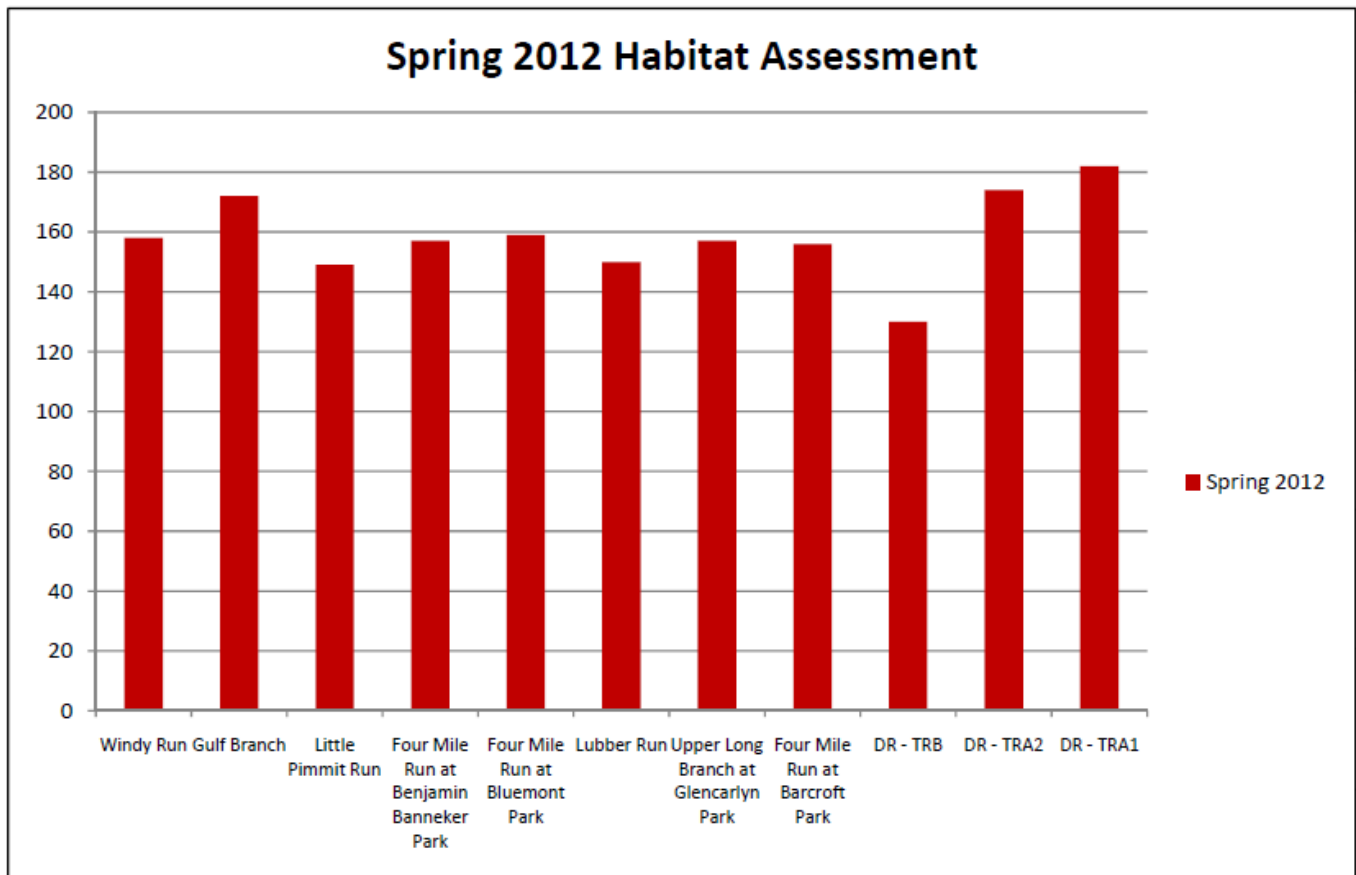
*Summary of Fall 2011 and Spring 2012 biological data*

The figure below depicts the Virginia Stream Condition Multi-Metric IBI scores for each site and how their scores differed between the fall and spring samplings. The Virginia Stream Condition Multi-Metric IBI has four potential ratings: Excellent ( $\geq 73$ ), Good (60-72), Stress (43-59), and Severe Stress ( $\leq 43$ ).



*Comparison of Fall and Spring Virginia Stream Condition Multi-Metric IBI Scores*

The figure below depicts the habitat assessment scores using the Habitat Assessment Field Data Sheet for High Gradient Streams (Barbour et al. 1999). The four potential categories of assessment are Optimal (166-200), Sub-optimal (133-153), Marginal (60-100), and Poor (0-57). All of Arlington's sites fell within the Optimal and Sub-optimal ranges. The lowest ranked site for habitat was Donaldson Run's Tributary B. A stream restoration design is currently under development for Tributary B.



*Spring 2012 habitat assessment scores*

WEG's conclusions included the following:

- Streamside water chemistry and temperature measurements, including dissolved oxygen, pH, conductivity, and water temperature, were well within the allowable ranges as defined by VA DEQ and EPA standards and criteria. The data do not indicate specific sources of severe stress on aquatic communities.
- Point sources of pollution were not evident at any of the monitoring stations based on basic water chemistry and benthic macroinvertebrate indicator taxa except at the Upper Long Branch site. This site was impacted by a drinking water main leak, which has been resolved. The Spring monitoring session at Upper Long Branch showed rebounded organism densities.
- Feeding group community composition showed that generalist feeders, collector-gatherers, were either dominant or subdominant at all stations during both sampling seasons. This suggests an environmental stress that limits the food sources at all stations.
- Overall, the Four Mile Run stations consistently showed the greatest degradation and lowest diversity in both seasons. This is likely related to urban land use associated with nonpoint source pollution.
- The Donaldson Run stations had higher quality conditions compared to Four Mile Run and were comparable to the Little Pimmit, Gulf Branch, and Windy Run in the Spring.
- Donaldson Run's restored reach demonstrated greater ecological health than the other reaches.

- All of the habitat assessment ratings for the monitoring sites were Optimal or Sub-optimal. This likely indicates that all of the monitoring sites have high physical potential for inhabitation and propagation by aquatic organisms, but are limited by the hydrology and nonpoint source pollution.

The sampled fish did not show signs of disease or physical abnormalities at any of the stations and the only non-native species collected was the green sunfish at Little Pimmit Run. The fish data indicates a high level of environmental stress at all stations.

Arlington County believes that its long-term watershed management program, and especially its stream restoration program, will have a positive effect on the macroinvertebrate community—an important indicator of stream health. Donaldson Run's restored reach produced the highest index score of all of Arlington's sites. As stream restoration projects like Donaldson Run 'mature,' it is expected that the macroinvertebrate community will improve. However, nonpoint source pollution, flashy hydrology, and high shear stresses resulting in stream bank erosion and habitat degradation will remain key stressors to the ecology of the system.

WEG also provided an analysis of the volunteer monitoring program and its data and provided several recommendations to improve the sampling methodology. Arlington has already adopted several of WEG's recommendations including:

- Reduce the number of sample periods. WEG recommended eliminating the summer and winter monitoring seasons. Arlington has eliminated the winter sampling season, but plans to continue the summer season monitoring in part to keep the volunteers engaged for a greater part of the year.
- Samples will be taken from representative, most-productive habitat in the streams. Samples will no longer be focused strictly in riffle-pool-riffle locations. Edge habitat will also be included for sampling where appropriate.
- Improved sorting procedures will be implemented to reduce sample bias. Volunteers will completely sort a random, sub-sample instead of picking organisms from a single container.

Since the sampling and sorting adjustments were implemented in April 2012, the monitoring teams are reaching the target abundance of 100 organisms (+/- 10%) on a more consistent basis with the supervision of County staff. Improvements in sampling techniques will generate a more robust data pool in the coming years and Arlington staff will continue to work with its volunteers to further improve sampling methods and data quality.

## **Bacteria monitoring**

See Section F.

## **Geomorphological monitoring**

As discussed in Section D, stream restoration is a key component of Arlington County's watershed management program, given the significant and ongoing stream degradation County-wide, the water quality, habitat, and infrastructure protection benefits of stream restoration, and the difficulty and long-term nature of retrofitting a heavily developed urban area with BMPs.

To plan and design the Donaldson Run and Donaldson Run Headwaters stream restoration projects, substantial geomorphological monitoring data were collected. Additional data have been collected to assess post-construction conditions for both restoration projects, the response of the Donaldson Run system to the significant rainfall events of late June 2006, and the performance of this system since repairs were completed in early 2007. Staff will continue to monitor the physical conditions of these systems over time to evaluate and maintain the benefits and functions of these restoration projects as well as to inform future restoration efforts.

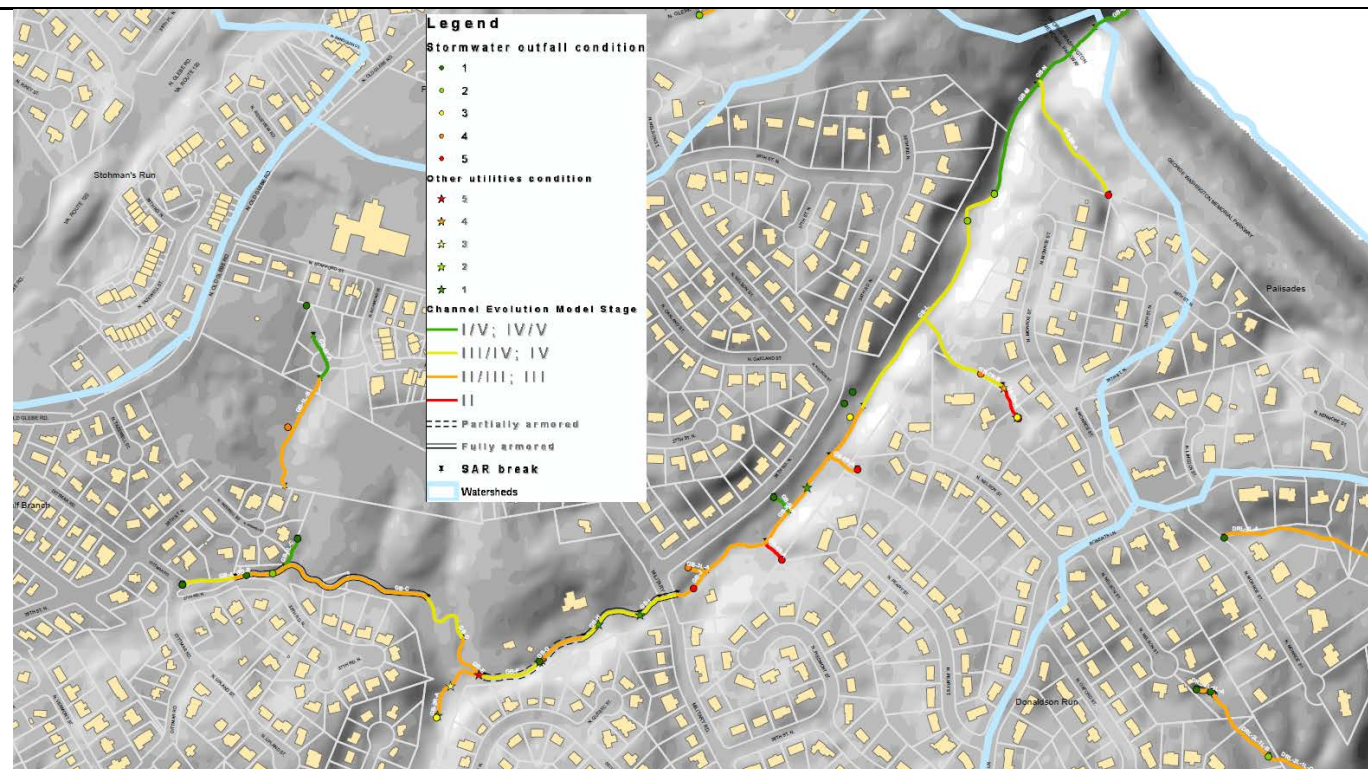
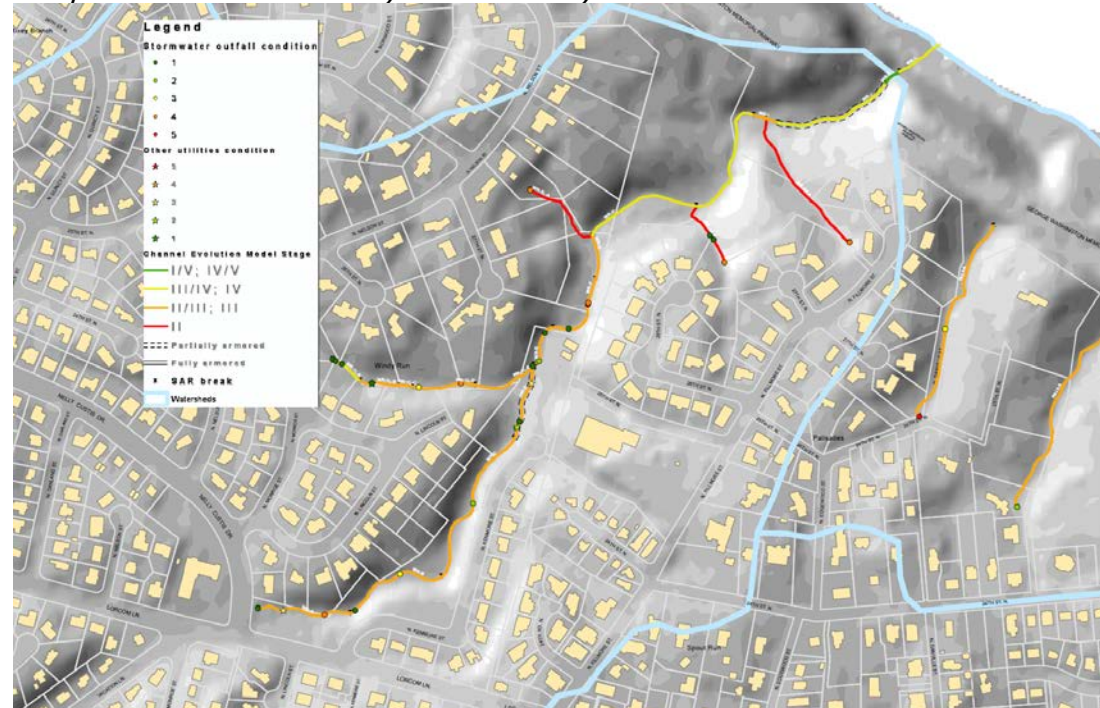
Substantial geomorphological data collection has also occurred for the planning and design of the Windy Run and Little Pimmit Run projects described in Section D.

These data collection efforts are essential for the proper planning, design, and assessment of stream restoration projects as well as a desirable use of limited staff resources available for monitoring efforts overall—given the County's focus on stream restoration and the substantial benefits in both the near- and long-term.

Completion of the field work associated with a comprehensive assessment of stream conditions across the County occurred in FY 2011. This effort focused on physical stream stability but also inventoried key habitat and infrastructure conditions along stream corridors. Analysis of the inventory results is underway to develop a prioritized blueprint for stream restoration projects as part of the update of the County's Stormwater Master Plan.



Sample of stream inventory data – Windy Run and Gulf Branch watersheds



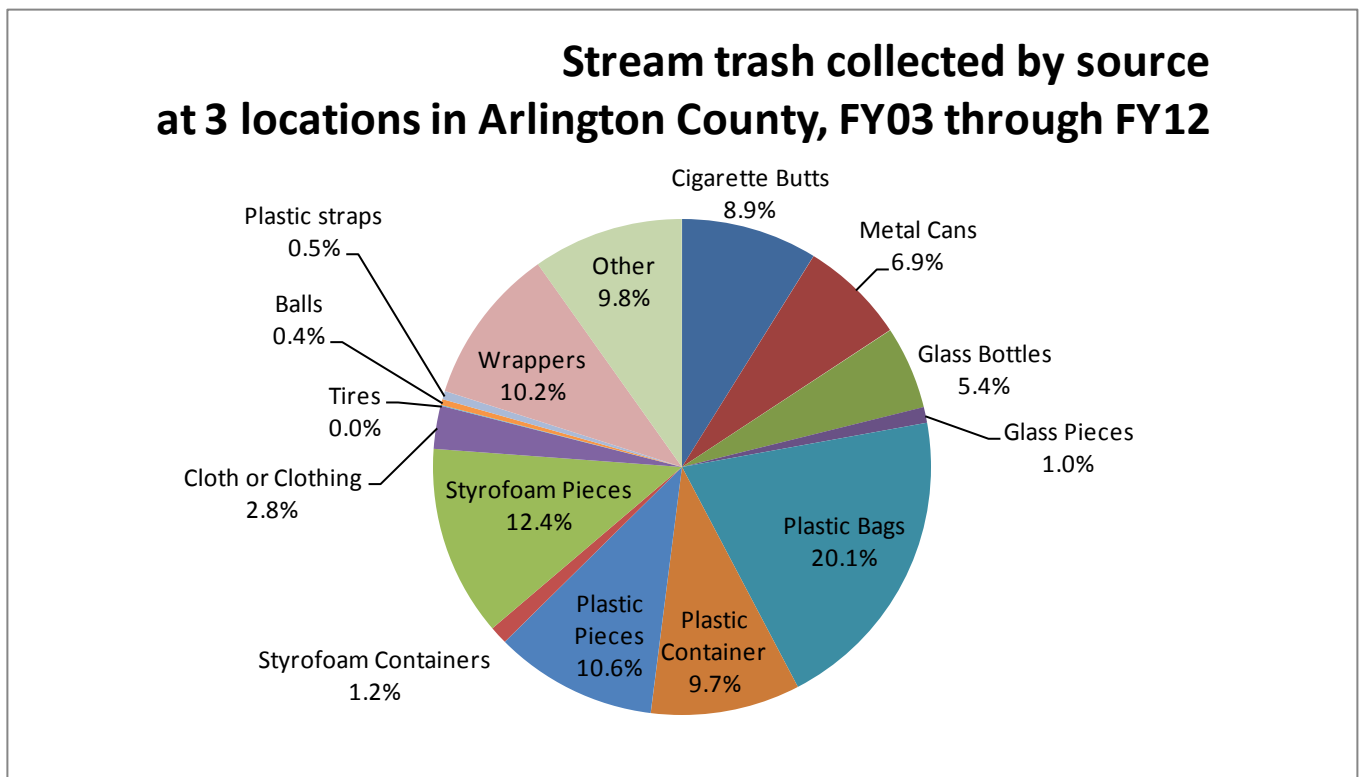
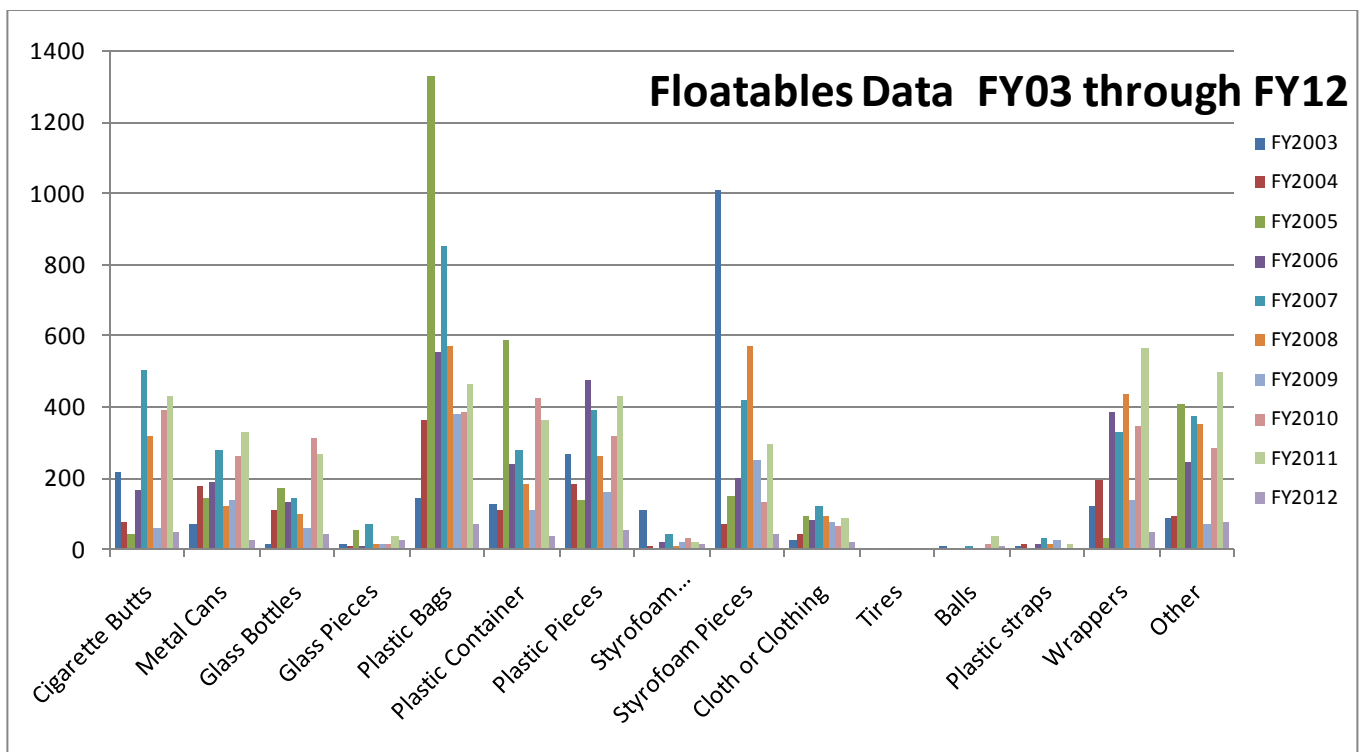
## Floatables monitoring

Consistent with the requirements of Section C.3 of the permit, Arlingtonians for a Clean Environment administers the required floatables monitoring program at three locations along Four Mile Run as part of ACE's year-round stream cleanup programs. The three locations include a site in lower Four Mile Run at Shirlington Park, one in middle Four Mile Run near Columbia Pike, and a third in upper Four Mile Run in Barcroft Park. Results of this program for FY 2012 are provided in the table below.

| Stream Cleanup Report - FY2012                                     |            |                 |            |               |              |              |                   |                |                      |                  |                   |       |       |                |          |       |              |
|--|------------|-----------------|------------|---------------|--------------|--------------|-------------------|----------------|----------------------|------------------|-------------------|-------|-------|----------------|----------|-------|--------------|
| Number of Trash Pieces by Category in a 100-Foot Section of Stream |            |                 |            |               |              |              |                   |                |                      |                  |                   |       |       |                |          |       |              |
| Location   | Date       | Cigarette Butts | Metal Cans | Glass Bottles | Glass Pieces | Plastic Bags | Plastic Container | Plastic Pieces | Styrofoam Containers | Styrofoam Pieces | Cloth or Clothing | Tires | Balls | Plastic straps | Wrappers | Other | Total Pieces |
| Barcroft Park  | 09/17/2011 | 30              | 5          | 12            | 20           | 30           | 26                | 50             | 0                    | 40               | 15                | 1     | 2     | 5              | 35       | 54    | 325          |
| Arlington Mill   | 03/09/2012 | 1               | 8          | 2             | 1            | 24           | 1                 | 2              | 0                    | 0                | 2                 | 0     | 0     | 0              | 3        | 1     | 45           |
| Shirlington Park   | 03/09/2012 | 20              | 14         | 30            | 4            | 17           | 13                | 5              | 18                   | 4                | 5                 | 0     | 6     | 0              | 10       | 24    | 170          |
| <b>Total</b>   | -          | 51              | 27         | 44            | 25           | 71           | 40                | 57             | 18                   | 44               | 22                | 1     | 8     | 5              | 48       | 79    | 540          |
| <b>Percentage</b>  | -          | 9.4%            | 5.0%       | 8.1%          | 4.6%         | 13.1%        | 7.4%              | 10.6%          | 3.3%                 | 8.1%             | 4.1%              | 0.2%  | 1.5%  | 0.9%           | 8.9%     | 14.6% | 100%         |

Data for FY 2003 through FY 2012 are provided in the graph below. There are a few results that stand out, including a large number of plastic bags in FY 2005 and FY 2007 and Styrofoam pieces in FY 2003, for example. It is also interesting to note that plastic bags, containers, and pieces together account for 40 percent of the trash collected by abundance, with Styrofoam pieces, cigarette butts, and wrappers the next most frequent trash types. Otherwise, the data are quite variable from year to year. Sampling variation by volunteers and rainfall prior to sampling likely affect the results, so it is difficult to draw too many conclusions from these data.

Overall, both the resident and daytime population of Arlington has been growing substantially over the past several years, and trash generation and littering is an indicator of the impacts of these population increases. Keeping pace with these increases and their impacts through public and private refuse and recycling collection efforts, along with street sweeping, catch basin cleaning, retrofits, education and other measures, will continue to be a challenging task in the years to come. See also the information about the Trash Free Potomac Watershed Initiative in Section K.



### 3 Assessment of the Storm Water Management Program

The comprehensive watershed management programs described in this and prior annual reports are all intended to reduce stormwater and nonpoint source pollution and improve water quality and habitat in County streams. A number of these programs are already producing positive results.

Overall, the systematic implementation of the County's Watershed Management Plan, including additional watershed retrofits and stream restoration projects, will provide further water quality benefits over the long-term (e.g., 20+ years), in conjunction with the requirements of the Chesapeake Bay Preservation Ordinance to provide on-site stormwater treatment as redevelopment occurs.

The watershed monitoring program that began during FY 2004 is too limited in geographic extent and collection frequency for establishing a water quality baseline and evaluating the overall effectiveness of County programs over the long term for in-stream water quality across the County. The County emphasizes the long-term nature of gathering meaningful data and assessing trends.

#### Macroinvertebrate monitoring data

The average number of orders collected by volunteers does not provide any information on the pollution tolerance levels of the collected organisms, but does provide an indication of the order-level taxa richness across the County (see table below). It is not surprising that WEG's sample, which was sorted by a professional taxonomist in a laboratory, resulted in a higher average number of orders. With Arlington's improved stream-side sorting method, we anticipate the average number of orders will increase for Arlington's sites.

|                   | Average<br>2001 -<br>Spring 2006 | Average<br>Summer<br>2006 -<br>2012 | WEG's average<br>order from Fall 2011<br>& Spring 2012 |
|-------------------|----------------------------------|-------------------------------------|--|
| Windy Run         | 1.9                              | 4.0                                 | 5  |
| Donaldson Run     | 1.5                              | 3.9                                 | 5  |
| Gulf Branch       | 0.7                              | 3.7                                 | 7  |
| Little Pimmit Run | 0.8                              | 4.2                                 | 5.5  |
| 4MR - Banneker    | 1.0                              | 3.7                                 | 6  |
| 4MR - Bluemont    | 1.3                              | 3.5                                 | 6  |
| Upper Long Branch | 0.8                              | 2.5                                 | 5.5  |
| 4MR - Barcroft    | NA                               | 4.3                                 | 5.5  |
| Lubber Run        | NA                               | 4.0                                 | 4.5  |
| Reference site    | 6.3                              | 6.5                                 | NA   |

*Average number of orders per sampling event*

The top two dominant taxons at all of Arlington's volunteer monitoring stations except Lubber Run, are the Ephemeroptera Baetidae, also known as the small minnow mayfly, and the Chironomidae, also known as midges. Lubber Run is sub-dominated by the Trichoptera Hydropsychidae. All three of these taxa are pollution tolerant. The dominant taxons at the

reference site are the Plecoptera, also known as the stonefly, and Ephemeroptera (non-Baetidae varieties). This indicates that conditions across Arlington's sites are similar, and not capable of supporting the pollution intolerant taxa found at the reference site.

In the past, an EPT index was used to analyze the macroinvertebrate data for Arlington's streams. However, with the assistance of WEG, Arlington has determined that this method of analysis is not the best choice. The EPT index is a measure of sensitive taxon in a sample, the Ephemeroptera, Plecoptera, and Trichoptera. However, Ephemeroptera and Trichoptera families that are found in Arlington are exceptions to their order and are actually tolerant taxa. Plecoptera have not been found in Arlington's streams. Without the presence of other families in each order, the EPT index is not well suited for Arlington's data and likely presents an overly optimistic assessment of the stream invertebrate community condition.

Arlington's volunteer program has historically compared the number of collected organisms amongst sites. Previous samples that produced less than 100 organisms were likely more a reflection of the collection method and not necessarily of the stream's ability to support the macroinvertebrate community.

With the implementation of improved sampling methods and additional training by County staff, it has become evident that all of Arlington's sites can produce the necessary minimum 100 (+/- 10%) organisms. Coupling this information with WEG's findings that all of the sites have the same or similar pollutant to dominant orders, and similar Virginia Stream Condition Multi-Metric IBI scores, indicates fairly comparable ecological conditions across the County.

Arlington plans in the coming years to begin to shift the current order-level of identification volunteer program to a family-level identification program once the teams are proficient with the new sampling and sorting methods that were introduced in FY12. A family-level identification program will allow Arlington to utilize the Virginia Stream Condition Multi-Metric IBI to compare conditions at the different monitoring sites. Prior to the full implementation of a family-level program, the Simpson's Index of Diversity and the Effective Number of Taxa (ENT) will be used to evaluate Arlington's order-level data. In order to perform these calculations, it will be important to have consistent sample sizes within the 100 (+/- 10%) organisms range.

### Bacteria monitoring data

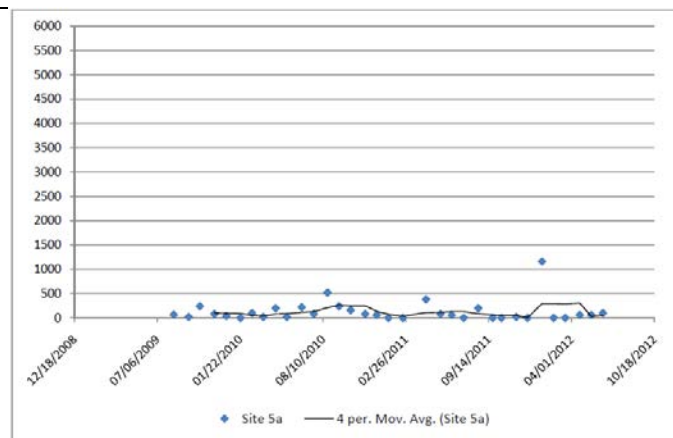
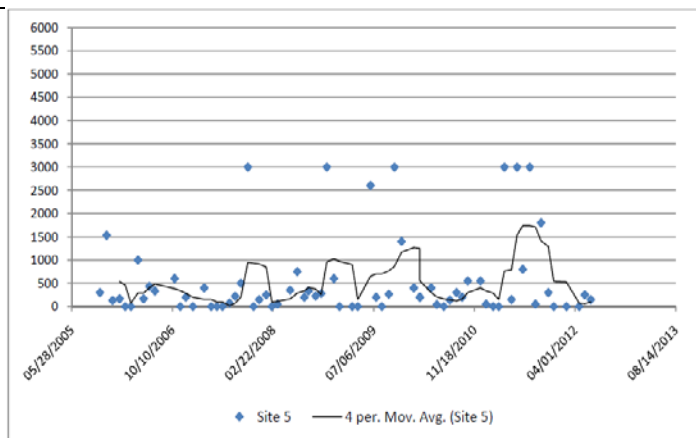
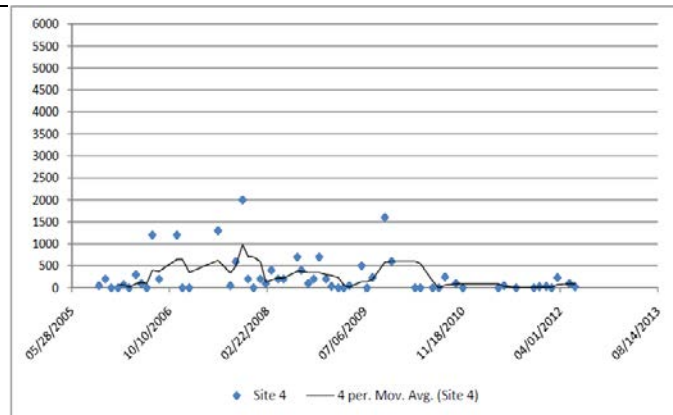
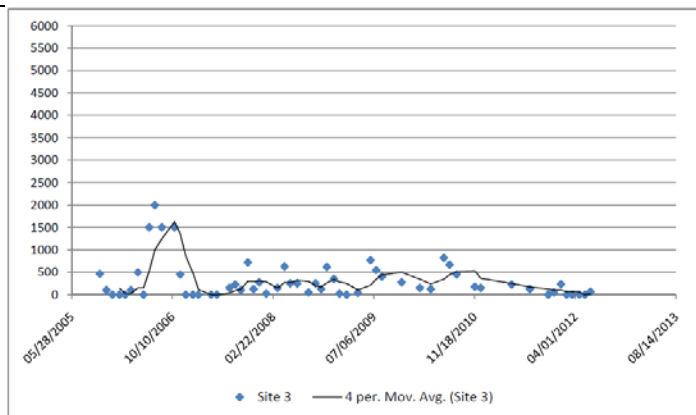
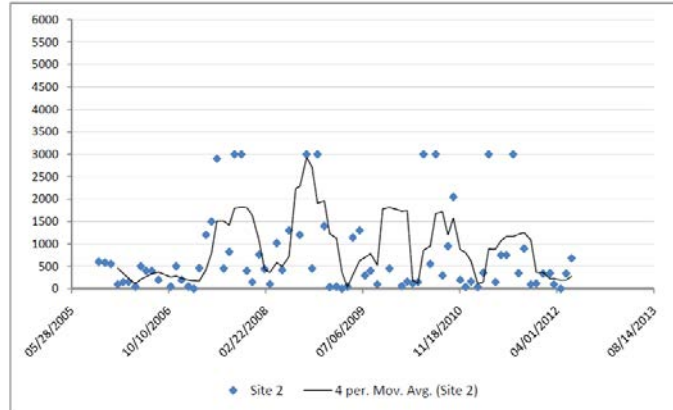
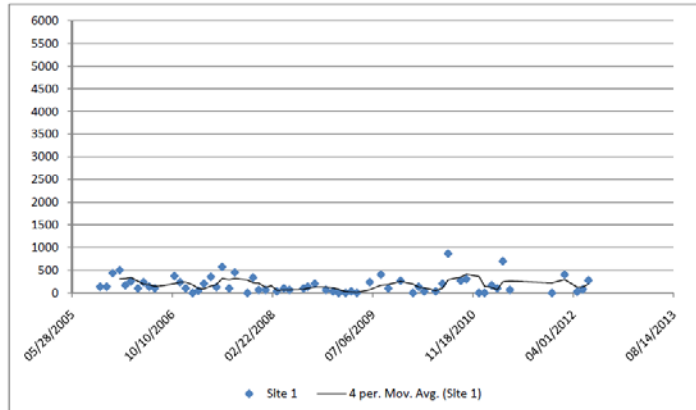
The trend analyses below were conducted through FY 2012. These analyses will be updated in future reports, depending on the requirements of the County's next MS4 permit.

Bacteria data are highly variable given the biological nature of the parameter. A moving average analysis for the 15 sites is presented in the graphs below.

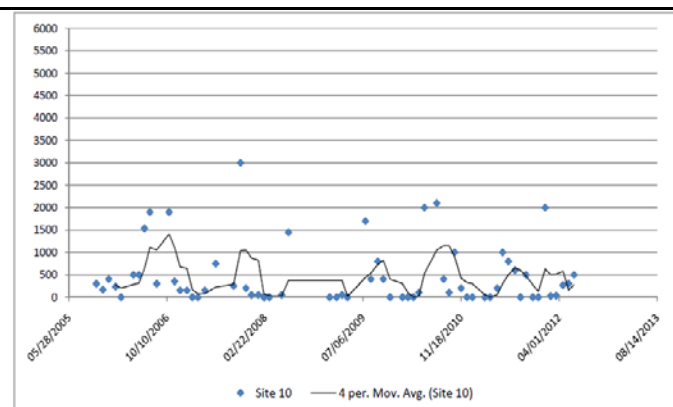
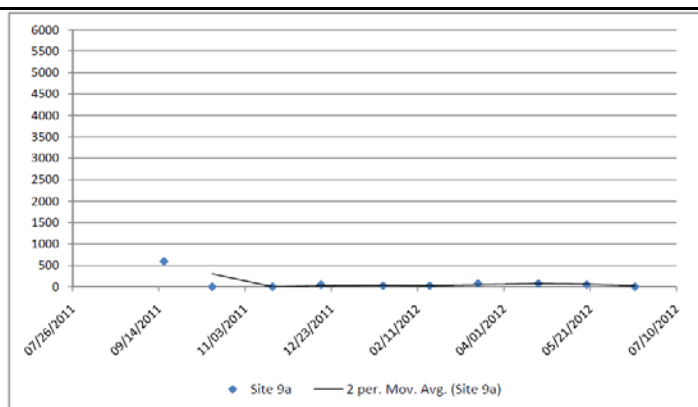
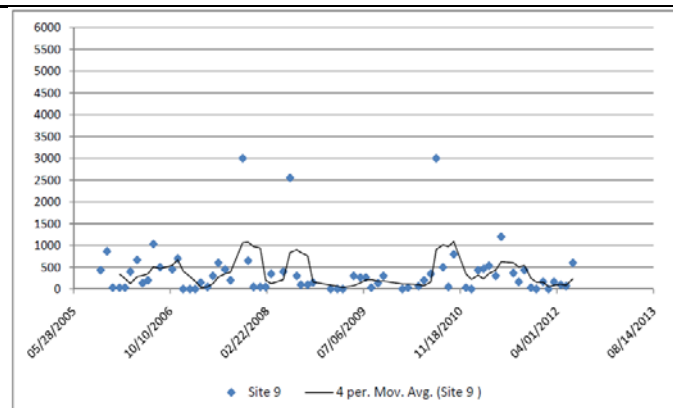
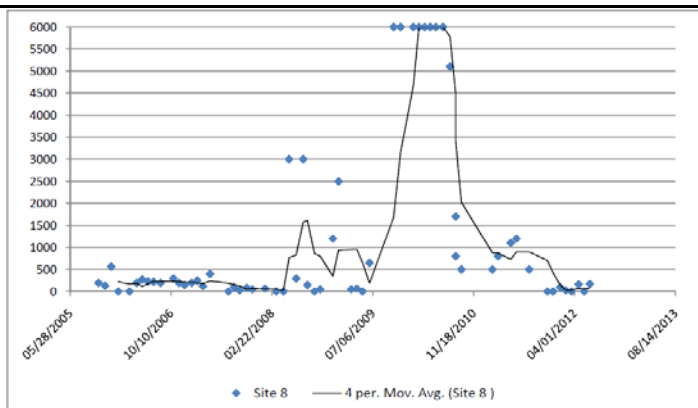
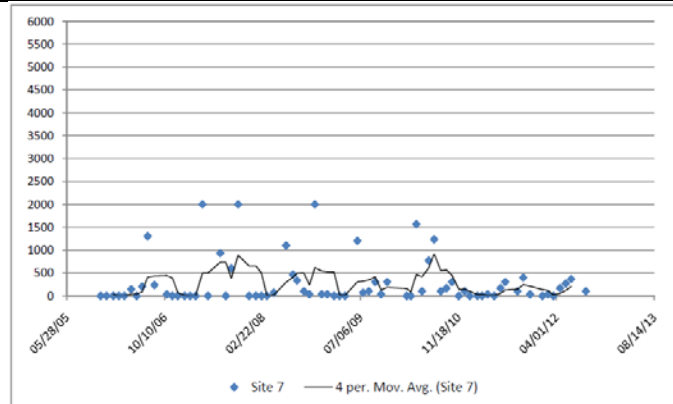
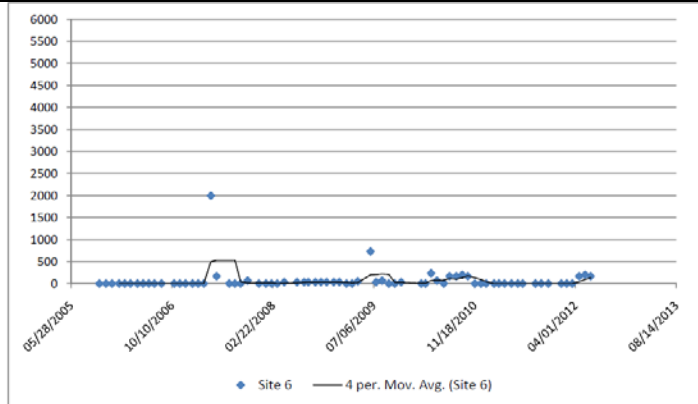
- Sites 1, 5a, 6, and 9a have remained fairly constant for the duration of monitoring.
- Sites 3 and 4 have been fairly constant since 2010.
- Site 8 has shown a downward trend since the monitoring responsibilities were shifted to a new volunteer and the recent samples have produced similar results. This trend indicates that the previous high readings were likely due to monitor error and were not true reflections of water quality as there have not been any other known changes within this reach of Four Mile Run.
- Site 2 levels have remained fairly erratic. The surrounding sewer lines in this area have been recommended for relining to the Water, Sewer, and Streets Bureau.
- The moving averages for Sites 5, 7, 9, 10, 11 and both Donaldson Run reaches do not show a discernable trend.



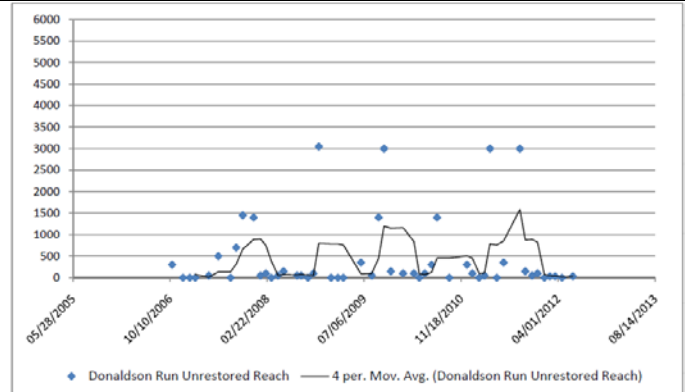
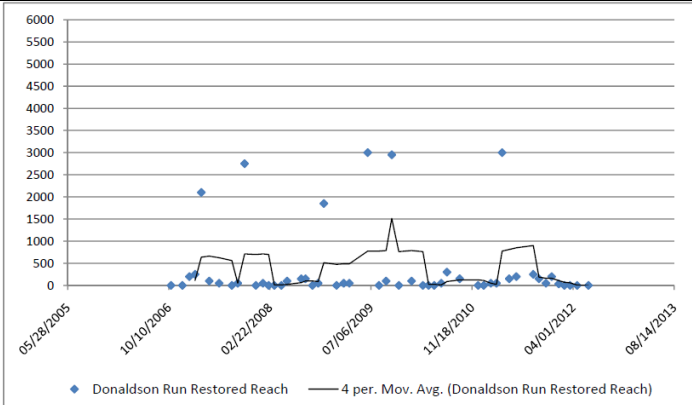
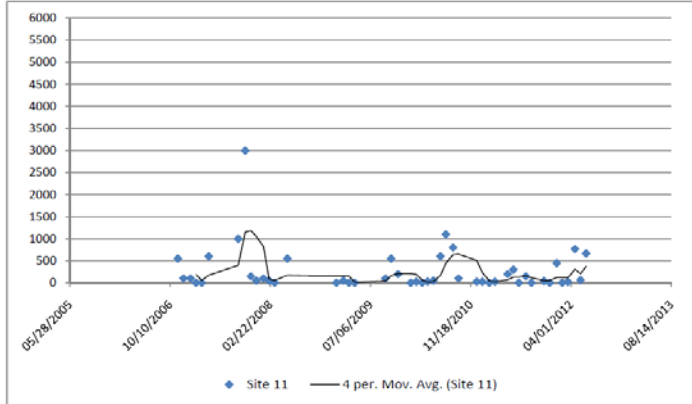
# *Moving average, E. coli concentrations, colonies/100 ml, 2005-2012*



## Moving average, *E. coli* concentrations, colonies/100 ml, 2005-2012



### *Moving average, E. coli concentrations, colonies/100 ml, 2005-2012*



### **Pollutant load modeling**

For FY 2009, staff updated a spreadsheet-based watershed loading model developed by the Center for Watershed Protection—the Watershed Treatment Model—to assess the pollutant load reductions achieved by the watershed management programs currently in place. These results were reported in past annual reports.

The next iteration of these modeling exercises will depend upon the specific requirements of the County's next MS4 permit.

## **4 Total Maximum Daily Loads**

In FY 2002, the Northern Virginia Regional Commission and the Virginia Department of Environmental Quality developed a bacterial TMDL for the non-tidal portion of the Four Mile Run watershed. Because most of the watershed is located in Arlington County, County staff participated extensively in the development of this document (including partially funding the NVRC bacteria source identification study described in the FY 2001 report). In FY 2004, County staff, working closely with NVRC, DEQ, and the other watershed jurisdictions—Fairfax County,

the City of Alexandria, and the City of Falls Church—played a strong role in the development of the TMDL Implementation Plan, submitted to Virginia DEQ and DCR in March 2004. TMDL implementation is part of the larger watershed management programs of each jurisdiction. Most of Arlington's efforts for this TMDL have been described in annual reports, including this report, and future reports will continue to provide this information.

## **5 Program Resources**

Arlington County's watershed management program involves several different agencies. As described in this report, Primary management, including administration of the County's MS4 permit, is provided by DES/OSEM. Street sweeping and associated activities are conducted by the DES Solid Waste Bureau within the Operations Division. Much of the engineering, design, plan review and infrastructure planning work is the combined responsibility of the Facilities and Engineering Division, the Water, Sewer, Streets Bureau within the Operations Division, and OSEM. The Water, Sewer, Streets Bureau also manages the maintenance of sanitary and storm sewers. Public education is conducted by both DES and DPR, and cleanup of spills and hazardous materials is conducted by the Fire Department. Monitoring, both wet weather and dry weather field screening, is carried out by DES staff. Follow-up and remediation of illicit discharges is also a combined responsibility.

The County Board approved a sanitary district tax in April 2008 to fund an expanded stormwater management program. The approved sanitary district tax rate is currently \$0.013 per 100 dollars of assessed property value. This tax generated approximately \$7.5 million in funding for FY 2012, with all tax revenues placed in a dedicated Stormwater Fund. These funds provide operating resources for stream restoration and watershed retrofit planning and design, site inspections, stormwater facility inspections and maintenance, engineering plan review, and regulatory compliance. The Stormwater Fund also provides capital funding for system capacity improvements in critical locations (many identified as a result of the June 2006 storm), proactive system maintenance and replacement, stream restoration projects, watershed retrofits to improve water quality in County streams, implementation of the adopted Four Mile Run Restoration Master Plan, and to address federal and State regulatory requirements.

## 6 EPA Reporting Requirements

The following table lists the BMPs that were installed in Arlington County during FY 2012. BMP inspection/maintenance requirements are as described in Section B.

All of Arlington lies within the Middle Potomac-Anacostia-Occoquan Hydrologic Unit (HUC 02070010).

| Structure ID | BMP Type     | Receiving Waterbody             | Treated Area | Impervious Area Treated |
|--------------|--------------|---------------------------------|--------------|-------------------------|
| 04-935       | UNDERGROUND  | Doctor's Branch                 | 0.29         | 0.28                    |
| 05-972       | BIORETENTION | Four Mile Run, Middle Mainstem  | 0.8          | 0.26                    |
| 06-1005A     | TRENCH       | Four Mile Run, Upper Mainstem 2 | 0.72         | 0.034                   |
| 06-1005B     | MANUFACTURED | Four Mile Run, Upper Mainstem 2 | 0.07         | 0.07                    |
| 06-1017B     | UNDERGROUND  | Rocky Run                       | 0.45         | 0.45                    |
| 06-1022A     | UNDERGROUND  | Spout Run                       | 0.44         | 0.39                    |
| 06-1022B     | MANUFACTURED | Spout Run                       | 0.0911       | 0.0911                  |
| 06-1022C     | MANUFACTURED | Spout Run                       | 0.0478       | 0.0478                  |
| 07-1038A     | UNDERGROUND  | Arlington Branch                | 4.15         | 3.97                    |
| 07-1038B     | MANUFACTURED | Arlington Branch                | 0.6144       | 0.6144                  |
| 09-1094A     | UNDERGROUND  | Nauck Branch                    | 0.349        | 0.196                   |
| 09-1094B     | GREEN ROOF   | Nauck Branch                    | 0.1526       | 0.1526                  |
| 09-1096      | UNDERGROUND  | Spout Run                       | 1.95         | 1.07                    |
| 09-1102      | UNDERGROUND  | Spout Run                       | 0.91         | 0.88                    |
| 09-1109A     | TRENCH       | Little Pimmit Run, E. Branch    | 0.46         | 0.11                    |
| 09-1109B     | PAVERS       | Little Pimmit Run, E. Branch    | 0.0614       | 0.0614                  |
| 10-1120A     | TRENCH       | Rocky Run                       | 0.066        | 0.066                   |
| 10-1120B     | TRENCH       | Rocky Run                       | 0.068        | 0.068                   |
| 10-1120C     | TRENCH       | Rocky Run                       | 0.045        | 0.045                   |
| 10-1136      | PAVERS       | Virginia Highlands              | 0.083        | 0.083                   |
| 11-1160C     | BIORETENTION | Windy Run                       | 0.15         | 0.05                    |
| 11-1160D     | PAVERS       | Windy Run                       | 0.0341       | 0.0341                  |